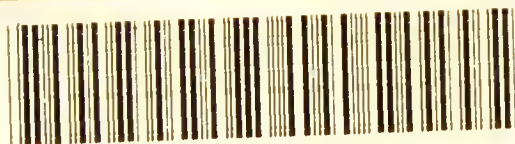


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THE
VEGETABLE KINGDOM
AND ITS PRODUCTS;

SERVING AS

An Introduction to the Natural System of Botany,

AND AS A

TEXT-BOOK OF ALL THE VEGETABLE SUBSTANCES

USED IN THE

ARTS, MANUFACTURES, MEDICINE, AND DOMESTIC ECONOMY:

ARRANGED ACCORDING TO THE SYSTEM OF

De Candolle.

ILLUSTRATED WITH NEARLY 250 ENGRAVINGS,
AND CONTAINING AN ENUMERATION OF 7,000 GENERA AND 4,000 SYNONYMES,
REPRESENTING ABOUT 100,000 SPECIES OF PLANTS.

BY ROBERT HOGG,

AUTHOR OF "BRITISH POMOLOGY," "THE MANUAL OF FRUITS," AND CO-EDITOR
OF THE "COTTAGE GARDENER."

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PREFACE.

THE growing interest that is exhibited in the study of Vegetable Products, the important position they occupy in the commerce of the world, and the difficulty there is in obtaining in botanical works sufficient information on the subject in a collected form, are the reasons that have induced the author to undertake the following work. His endeavour has been, to prepare, in a convenient and comprehensive form, a volume which shall serve as a Text-book to the study both of Systematic and Economic Botany; so that students, or general readers, may have at hand all attainable information respecting the whole of the Families of which the Vegetable Kingdom is composed.

The plan of the work is the same as that followed by ENDLICHER, in his *Enchiridion Botanicum*, but much greater prominence has been given to that part of the subject treating of the Properties and Uses of Plants.

The system of classification which has been adopted is that founded by the late eminent PROFESSOR DE CANDOLLE, of Geneva, but with occasional differences in the structure and sequence of the Families, where such a course is supported by the views of other distinguished botanists, or appeared to the author himself to be correct. The additional authorities that have been consulted on this subject are chiefly—RICHARD, BARTLING, ENDLICHER, VON MARTIUS, PERLEB, and ADOLPHE BRONGNIART; also the *Outlines of Botany* of the late PROFESSOR BURNETT, and the views of these and others as they have been embodied by DR. LINDLEY in his last published form of arrangement.

The descriptions of the Orders are based on those of DE CANDOLLE, ENDLICHER, and RICHARD, but more particularly on those of the two former,—the *Prodromus* of the one, and the *Enchiridion Botanicum* of the other, being the sources from which they were principally derived. These descriptions are aided by illustrations derived from the best sources.

In addition to the descriptions of the Orders, full definitions of the characters of the Sub-Orders, Tribes, Sub-Tribes, and Divisions, are given, by the aid of which, and the enumeration of the Genera in each, a plant may be traced to the group of which it forms a part.

The lists of the Genera and their Synonymes have been obtained from ENDLICHER's excellent work, already referred to, except in cases where monographs of Families have been published since it appeared, and of which advantage has been taken, so as to make the lists as complete as possible, and to afford the latest information on the subject.

All reference to the views of authors on the affinities of the Families is wholly avoided, it being thought of more service to devote that space to the Properties and Uses of Plants; such information being far more useful and instructive to the general reader, than opinions upon a subject about which no two botanists of any eminence are among themselves agreed.

In that portion devoted to the consideration of the Properties and Uses of Plants and their Products, all the information attainable on the subject has been collected from the best authorities. The works of the most eminent botanical discoverers and travellers have been consulted; the researches of modern pharmacologists and chemists have been taken advantage of; and from works on arts and manufactures considerable assistance has been derived. But as no information drawn from books can ever approach in value that which is acquired by an inspection and study of the things themselves, so not the least important aid was obtained from the Museums at Kew, the India House, the Crystal Palace, and South Kensington. To these sources, and to assistance afforded by gentlemen connected with the commerce of the metropolis, the author is especially indebted.

Doubtless, in a work like the present, the critical observer will meet with some mistakes; but it is hoped that these consist more in errors of oversight than of judgment, and that they are not of such importance as to detract at all from the usefulness of the work.

R. H.

61, WINCHESTER STREET, PIMLICO.

MAY, 1858.

A NATURAL HISTORY

OF

THE VEGETABLE KINGDOM.

INTRODUCTION.



THE Animal and Vegetable Kingdoms may be aptly compared to the primary colours of the prismatic spectrum, which are so gradually and intimately blended, that we fail to discover where the one terminates and the other begins. If we had to deal with *yellow* and *blue* only, the eye would easily distinguish the one from the other; but when the two are blended and form *green*, we cannot tell where the blue ends and the yellow begins. And so it is in the Animal and Vegetable kingdoms. If our powers of observation were limited to the highest orders of animals and plants,—if there were only Mammals, Birds, Reptiles, Fishes, and Insects in the one, and Trees, Shrubs, and Herbs in the other,—we should then be able with facility to define the bounds of the two kingdoms. But as we descend the scale of each, and arrive at the lowest forms of animals and plants, we there meet with bodies of the simplest structure, sometimes a mere cell, whose organisation, modes of development and reproduction, are so anomalous, and partake so much of the character of both, that we cannot distinguish whether they are plants or whether they are animals.

Plants have been described by naturalists, who would determine the limits of the two kingdoms, as organised living bodies, without volition or locomotion; destitute of a mouth or intestinal cavity; which, when detached from their place of growth, die, and in decay ferment, but do not putrify;

and which, on being subjected to analysis, furnish an excess of carbon and no nitrogen. But the powers of chemistry and of the microscope, instead of confirming these views, tend more and more to show that a still closer affinity exists between plants and animals; for it is now ascertained that nitrogen, which was believed to be present only in animals, enters largely into the composition of plants also. When the microscope is brought in to aid our powers of observation, we find that there are organised bodies belonging to the Vegetable Kingdom which possess very evident powers of locomotion, and which change about in so very remarkable a manner, that no other cause than volition can be assigned to it. In the family called *Brittleworts* (Diatomaceæ), which comprises the lowest forms of plants, and which are generally found in the form of a green mucous slime on the surface of stones, in damp places where the sun never reaches, we find examples of this locomotion and volition; and among the *Water-weeds* (Confervaceæ) we meet with bodies, which are animal during one part of their existence and vegetable at another. Kützinger, a German naturalist, asserts that in *Ulothrix zonata*, one of these Water-weeds, minute animalcules are found, with a red eye-point and transparent mouth-place; these retain their animal form only for a time, and at last grow into vegetable threads, still preserving the red eye-point at the lowest joint of the thread. Among the *Sea-weeds* (Fucaceæ), there is *Vaucheria clavata*, the singular economy of which is related by Unger. He observed that the terminal vesicles of this plant burst when they arrived at maturity, and the seed or sporule thus set free swam about with great activity. After about an hour it began to change its form and colour, lost its apparent or real animal character, and became stationary; in a short time it put forth a root and then a stem; and after fixing itself to the nearest substance, in about eleven days it bore fructification after the same manner as the body which produced it. Even in decay, we find the same near approach to animals among the *Brittleworts*, a sub-order of which rapidly become putrid like animal matter. What the powers of science may yet accomplish we cannot tell; but with the present amount of knowledge we have on the subject, we are unable, with any degree of certainty, to define the bounds between the Animal and Vegetable Kingdoms.

The Vegetable Kingdom, so far as it is at present known, is composed of above 92,000 species of plants. When we meet with such a mass of individuals, the first idea suggested to the mind is, how shall we arrange them as most easily to arrive at a knowledge of their properties and uses; and

wherein do they differ the one from the other? From the Beginning we find the Creator himself speaking of plants after a form of arrangement: "Behold I have given you every *herb* bearing seed, which is upon the face of all the earth, and every *tree* in the which is the *fruit* of a tree yielding seed; to you it shall be for *meat*." Here we have, first, the division into Herbs and Trees, then the trees into those bearing fruit which were to be for the food of the human species. The earliest botanists adopted such simple forms of classification; some arranged them according to their ligneous or herbaceous structure, some according to their alimentary or medicinal properties, while others divided them into terrestrial or aquatic, according to the situations in which they were found.

The first attempt at anything like a scientific arrangement of plants was produced by Cæsalpinus, an Italian, who, in 1583, distributed them into *Trees* and *Herbs*. The first he divided into two classes, the characters of which were based upon the situation of the ovary or young seed-vessel; and the second into thirteen classes, with the characters taken from the number of the seeds, seed-vessels, and the internal structure of their cavities. This mode of arrangement suggested to Robert Morison, a Scotchman, and Professor of Botany at Oxford, the idea of a system which advances a step farther towards a natural arrangement, and in which we see the dawn of that system which has now superseded all others. The eminent English naturalist, John Ray, proposed a system after the manner of Morison, whom he acknowledges as his guide, which was another step in advance; but in his "amended method," where he introduces the great divisions of Flowerless and Flowering plants, the latter divided into Monocotyledons and Dicotyledons, we recognise the starting point of all modern classification, which enables us at once to pronounce John Ray the founder of botanical alliances. In Tournefort's system the classes were derived from the presence, and form, or absence of the corolla; and this, for many years, was the classification followed on the Continent, till both it, and that of Ray in this country, gave place to the artificial system of Linnæus, a system which has been more universally adopted, and continued in use for a greater length of time than any other. Although Linnæus was so successful with his artificial arrangement, he was fully conscious that one based on more philosophical principles was wanting, and therefore he concentrated his energies on the construction of a natural system based on the affinities of plants; and this he gave to the world in 1738, but it was not received. In 1759, Ber-

nard de Jussieu, adopting the primary divisions of Ray, laid the foundation of the natural system, which bears his name, and which was perfected by his nephew, Antoine Laurent de Jussieu. As it is the classification still followed in France, it is here given at length:—

		Classes.	
ACOTYLEDONS		1	Acotyledonæ.
DICOTYLEDONS.	MONOCOTYLEDONS {	Hypogynous	2 Monohypogynæ.
	Stamens . . {	Perigynous	3 Monoperigynæ.
		Epigynous	4 Monocypignæ.
	Apetalous . . {	Epigynous	5 Epistaminæ.
		Perigynous	6 Peristaminæ.
		Hypogynous	7 Hypostaminæ.
	Monopetalous {	Hypogynous	8 Hypocorollæ.
		Perigynous	9 Pericorollæ.
		Epigynous . . {	Anthers united } 10 Epicorollæ synanthereæ.
			Anthers distinct } 11 Epicorollæ chorisanthereæ.
	Polypetalous . {	Epigynous	12 Epipetalæ.
		Hypogynous	13 Hypopetalæ.
		Perigynous	14 Peripetalæ.
	Dichinous		15 Dichinæ.

It has not been thought necessary to take notice of any except those systems which have served as a basis for modern classifications. Many others have been attempted; and, indeed, there are few having any pretensions to eminence in botanical science, but have proposed some one or other of their own. Since the time that botanists first began to arrange the Vegetable Kingdom, there have been little short of fifty or sixty different forms of arrangement introduced, and the number is still increasing, every succeeding writer fancying he sees a more correct method of distributing the alliances than his predecessors; and, until botanists themselves shall agree upon a system which all may safely follow, it would be fruitless for the student to run after every new theory which is propounded. Of all the arrangements, according to the Natural System, which has been most favourably received is that form of Jussieu's, which was introduced by De Candolle; and as it has been adopted by the most eminent botanists of this country and

America, we have thought it advisable to follow it in the present work, with such modifications taken from the classifications of Jussieu, Endlicher, Brongniart, and others, as we have considered of importance to render it more complete and intelligible.

While the Natural System of Jussieu begins with the lowest forms of plants and rises to the highest, that of De Candolle begins with the highest and descends to the lowest; and it is to this latter course that we shall in the present instance adhere.

The Vegetable Kingdom admits of two great divisions:—I. FLOWERING PLANTS called *Phænogamæ*, *Cotyledonæ*, or *Vasculares*. II. FLOWERLESS PLANTS called *Cryptogamæ*, *Acotyledonæ* or *Cellulares*. These are again divided into sub-divisions, classes, and orders.

DIVISION. I.—FLOWERING PLANTS.—PHÆNOGAMS.

EXOGENS or DICOTYLEDONS.—Embryo with two seed leaves. Stem increased by external layers. Leaves furnished with veins, arranged in the form of net-work.

I. THALAMIFLORÆ.—Calyx with separate divisions, and the Corolla with distinct petals. The petals and the stamens inserted in the receptacle (thalamus or torus).

II. CALYCIFLORÆ.—Petals and stamens inserted in the calyx, or in that part of the receptacle contiguous to it.

III.—COROLLIFLORÆ.—Corolla with the petals united, and not inserted in the calyx.

IV.—ACOROLLIFLORÆ.—Flowers without petals, and having only a single floral envelope.

ENDOGENS OR MONOCOTYLEDONS.—Embryo with one or many alternate seed-leaves. Stem increased by the internal production of cellular tissue, and bundles of fibre. The veins of the leaves running parallel to each other, but sometimes slightly in the form of network.

I.—DICTYOGENÆ.—Veins of the leaves in the form of network. Wood of the stem, when perennial, arranged in a circle with a central pith.

II.—PETALOIDEÆ.—Leaves with parallel veins. The flowers usually consist either of a coloured floral envelope, or of whorled scales.

III.—GLUMIFERÆ.—Flowers glumaceous, consisting of imbricated scales called bracts. Veins of the leaves parallel.

RHIZOGENS.—Embryo without seed leaves, fructification springing from a thallus. Stem a mass of cellular tissue, without fibre, and in place of leaves, furnished with cellular scales.

DIVISION. II.—FLOWERLESS PLANTS.—CRYPTOGAMS.

ACROGENS.—Embryo without seed leaves. Plants with a distinct stem, bearing leaves or branches.

THALLOGENS.—Embryo without seed leaves. Plants having no distinct stem, nor leaves; but forming a cellular expansion of various kinds which bears the organs of reproduction.

Having thus given an outline of the arrangement into which botanists have distributed plants, we shall now proceed to treat these primary divisions more at length, and to carry out our main purpose of giving a Natural History of the Families of Plants, and their application, either in medicine, in the arts, or to the common necessities of life.



DIVISION I.—FLOWERING PLANTS.—PHÆNOGAMS.

THE names which have been applied by botanists to this great primary division of plants are, PHÆNOGAMÆ, COTYLEDONEÆ, and VASCULARES. The first, which signifies *plants with conspicuous flowers*, is the most correct designation, as it not only embraces all the vascular, but includes also those cellular plants called *Rhizogens*, which have conspicuous and perfect flowers, cellular organisation, and which, in germination, are destitute of seed leaves.

Phænogams are plants composed of cellular and vascular tissue, furnished with real or proper flowers, having stamens or pistils, or both, and which produce seeds containing an embryo that, on germination, becomes a plant similar to that from which it originated. They are composed of three fundamental organs—the root, the stem, and the leaves—which are apparent in the earliest stage of development, and are then called the radicle, the plumule, and the cotyledons. The only exception to this definition are the *Rhizogens*, which are composed of cellular tissue only, have no proper root, stem, or leaves, but are possessed of real flowers, containing stamens and ovaries, producing seed which contains an embryo, but without seed leaves. These, therefore, form the connecting link between the Flowering and Flowerless plants.

The Flowering Plants, or Phænogams, are arranged into three subdivisions—EXOGENS, ENDOGENS, and RHIZOGENS. We shall now consider the first of these, leaving the others till they come, in due course, in a subsequent part of the work.

SUB-DIVISION I.—EXOGENS OR DICOTYLEDONS.

Exogens, or Dicotyledons, include by far the greatest portion of the Vegetable Kingdom, and contain the most of our Forest Trees, Shrubs, and Herbaceous Plants. They comprise all those plants which, in germination, have two cotyledons or seed-leaves. For the sake of illustration, we shall take the germination of the Kidney Bean, which is familiar to everybody, as an example of the first development of an

exogenous plant. Fig. 1. represents the seed before it is committed to the soil; *a* is the *hilum*, or point of union by which it was united to the seed-pod; *b* is the small opening (*micropyle*) through which the rootlet (*radicle*) is protruded. When the seed is placed in circumstances favourable to germination, it absorbs moisture, and is swollen; its radicle is elongated through the opening, Fig. 2, and penetrates into the soil; the skin is ruptured; the young stem (*caulicle*), Fig. 3, *A*, extends upwards, bearing the two seed-leaves (*cotyledons*), *c, c*, which furnish nutriment to the young plant, and which, when the young stem and first leaves, *d, d*, are developed, wither and fall off. Germination is now completed, and the second period of development begins.



In young growths of exogenous stems, it is easy to distinguish a cuticle (*epidermis*), a cellular envelope (*sub-epidermoid tissue*), a proper bark (*liber*), the wood, and a central pith. The nerves of the leaves exhibit very varied network, and the flowers are, in general, furnished with two floral envelopes, called the calyx and corolla. In making a transverse section of an exogenous tree which has become a little aged, Fig. 4, it will be found to consist of three distinct parts,—the

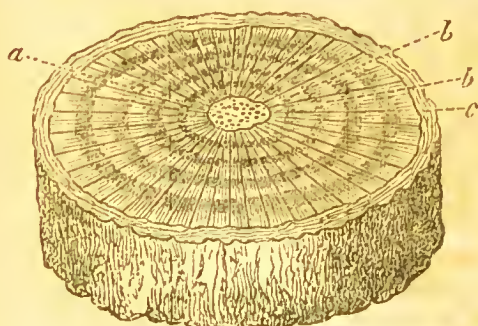


Fig. 4.

medullary canal (*a*), which contains the *pith*; between the medullary canal and the bark is found the *wood*, *b, b*, composed of concentric layers placed one above the other, each distinct layer being produced from the growth of one year; and at the circumference enclosing the whole we have the *bark* *c*, composed of layers, the interior being called the

liber or *inner bark*, on the outside of which are the *cortical layers*.

The number of exogenous ligneous plants capable of becoming trees is much greater than that of Endogens, and it is among the ligneous species of these two great divisions that we observe the greatest difference. It is impossible to confound an Oak or an Elm with a Palm: the former are Exogens, and the latter is an Endogen. An exogenous ligneous plant has a stem or trunk, simple in its inferior, and branched in its superior part. The trunk is continued under ground, forming an axis, or reversed cone, and its organisation and division into ramifications are very nearly the same as those of the branches. Thus the vegetable axis is represented as two opposite cones, Fig. 5, placed base to base, at A, which is called *the collar*; one being superior and bearing leaves on its extreme ramifications, whilst the other is inferior and underground, producing root-fibres.

The disposition of the nerves of the leaves is also a character which distinguishes Exogens. They take their rise both from the sides of the mid-rib, as well as of its divisions, and go on ramifying and crossing each other so as to form a sort of fine and irregular network.

Having thus given the principal features which distinguish Exogens from the other sub-divisions of the Vegetable Kingdom, let us now consider them in the Classes and Orders into which they have been arranged, viz., I. THALAMIFLORE; II. CALYCIFLORE; III. COROLLIFLORE; and, IV. ACOROLLIFLORE.

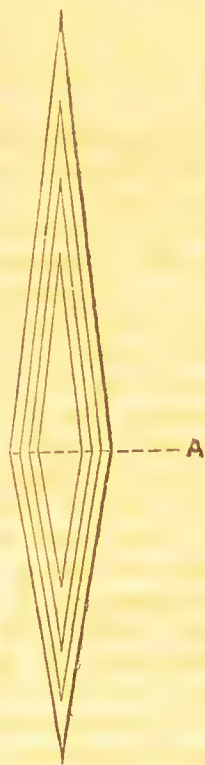


Fig. 5.



CLASS I.—THALAMIFLOREÆ.

Flowers provided with two floral envelopes (*dichlamydeous*), that is, with both a calyx and corolla; the calyx divided into several distinct seg-

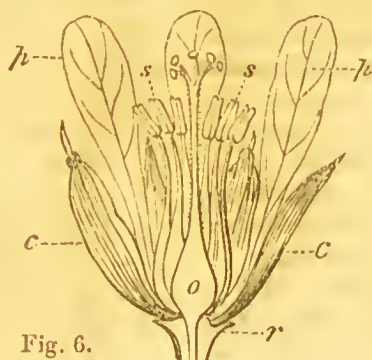


Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.

ments Fig. 6 *c*, and the corolla composed of petals entirely separated from each other *p*. The stamens *s* along with the petals, are inserted under the base of the ovary *o*, or in the receptacle *r*, and therefore called *hypogynous*.

Group 1. Carpels numerous. Fig. 10 B.

- Order 1. RANUNCULACEÆ.
 2. DILLENIACEÆ.
 3. MAGNOLIACEÆ.
 4. ANONACEÆ.
 5. MENISPERMACEÆ.
 6. BERBERIDACEÆ.
 7. CABOMBACEÆ.
 8. NYMPHÆACEÆ.
 9. NELUMBIACEÆ.

Group 2. Carpels solitary, or united at their base; Placenta parietal, that is, having the seeds attached either to the inner surface of the seed vessel or to partitions issuing from it. Fig. 7.

- Ord. 10. SARRACENIACEÆ.
 11. PAPAVERACEÆ.
 12. FUMARIACEÆ.
 13. CRUCIFERÆ.
 14. CAPPARIDACEÆ.

Ord. 15. RESEDACEÆ.

16. FLACOURTIACEÆ.
 17. CISTACEÆ.
 18. VIOLACEÆ.
 19. DROSERACEÆ.
 20. POLYGALACEÆ.
 21. TREMANDRACEÆ.
 22. TAMARICACEÆ.
 23. FRANKENIACEÆ.

Group 3. Ovary or seed vessel solitary. Fig. 6 *o*. Placenta central, that is, the seeds attached to a column situated in the centre of the seed-vessel. Fig. 8.

- Ord. 24. ELATINACEÆ.
 25. CARYOPHYLLACEÆ.
 26. VIVIANIACEÆ.
 27. MALVACEÆ.
 28. STERCULIACEÆ.
 29. BYTTNERIACEÆ.
 30. TILIACEÆ.
 31. DIPTEROCARPACEÆ.

- Order 32. CHLENACEÆ.
 33. TERNSTRÖMIACEÆ.
 34. OLACEÆ.
 35. CYRILLACEÆ.
 36. AURANTIACEÆ.
 37. HYPERICACEÆ.
 38. CLUSIACEÆ.
 39. MARCGRAVIACEÆ.
 40. HIPPOCRATEACEÆ.
 41. MALPICHACEÆ.
 42. ERYTHROXYLACEÆ.
 43. ACERACEÆ.
 44. SAPINDACEÆ.
 45. RHIZOBOLACEÆ.
 46. MELIACEÆ.
 47. HUMIRIACEÆ.
 48. CEDRELACEÆ.
 49. VITACEÆ.

- Order 50. PITTOSPORACEÆ.
 51. BREXIACEÆ.
 52. LINACEÆ.
 53. OXALIDACEÆ.
 54. BALSAMINACEÆ.

Group 4. — Ovaries numerous, either distinct or connate, arranged round the base of a central axis, to which they adhere. Fig. 9.

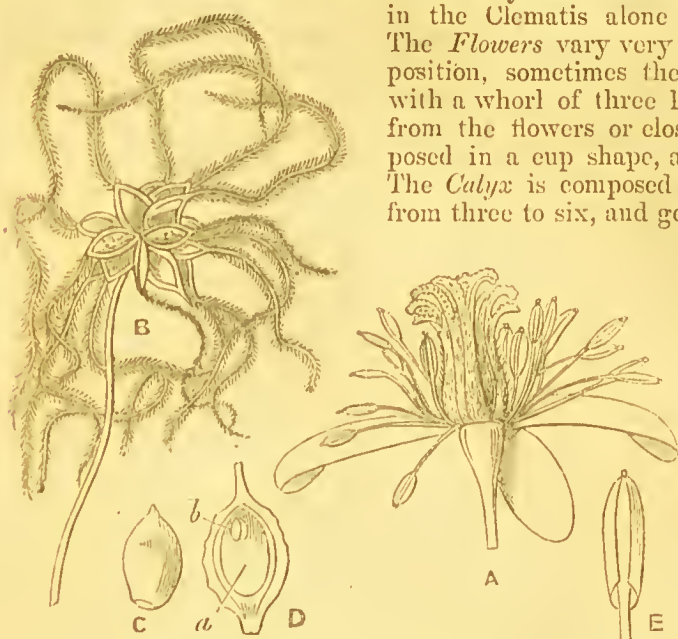
- Order 55. GERANIACEÆ.
 56. TROPÆOLACEÆ.
 57. LIMNANTHACEÆ.
 58. ZYGOPHYLLACEÆ.
 59. RUTACEÆ.
 60. DIOSMACEÆ.
 61. OCHNACEÆ.
 62. SIMARUBACEÆ.



ORDER I.—RANUNCULACEÆ—THE CROWFOOT FAMILY.

This great family is composed of herbaceous or half shrubby plants, with *Leaves* which are alternate, much divided, and widened at the base, where they form a sheath round the stem; in the *Clematis* alone are they opposite. The *Flowers* vary very much in their disposition, sometimes they are accompanied with a whorl of three leaves, either remote from the flowers or close to them, and disposed in a cup shape, as in the *Anemone*. The *Calyx* is composed of many segments, from three to six, and generally fall off very

early, but sometimes it is coloured and has the appearance of a corolla, and then it is more permanent. Before opening, the edges are either over-lapping each other (imbricate), Fig. 11, or placed in contact without over-lapping (valvate) Fig. 12, *Petals* distinct,

Fig. 10. *Clematis angustifolia*.

inserted under the ovary; in number equal, double, or triple that of the segments of the calyx; but sometimes they are wanting, and then the calyx is coloured and large, having the appearance of a corolla. In some cases they are flat, with a small indentation, or glandular scale, at the internal base, Fig. 14 A; but often they are deformed, or irregularly hollowed into the form of a horn or spur and suddenly clawed at the base, Fig. 15 D. The *Stamens* are generally numerous, indefinite in number, distinct, and situated under the ovary. Anthers in a line with the filaments, Fig. 10 E. The *Carpels*, or seed-vessels, are indefinite in number, sometimes one-seeded and collected into a sort of head (capitule), Fig. 10 B; or many seeded, and gathered together in a whorl, Fig. 15 B; or sometimes more or less closely united so as to form a many-celled pistil, each terminated by a short and simple style, which is usually lateral. The *Fruits* are either one-seeded, unopening (indehiscent), and arranged in heads, Fig. 10 B, or in spikes; or they are a collection of capsules, distinct or united, Fig. 15 B, sometimes solitary, one-celled, many



Fig. 11.

Fig. 12.

seeded, opening by the internal suture, Fig. 15 c, which bears the seeds; very rarely it is a many-seeded berry. The *Seeds* are indefinite in number, erect, pendent, or horizontal. The embryo, Fig. 10 d b, which is very small, has the same direction as the seed, and is contained in the base of the albumen, d a.

DIVISION I.—CARPELS ONE-SEEDED.

TRIBE 1. *Clematideæ*.—Fig. 10. Calyx in æstivation valvate (Fig. 12), or induplicate (Fig. 13). Some with no petals, others with the petals flat, and shorter than the calyx. Seed-vessels (carpels) not opening, one-seeded, and terminated with a long bearded style, Fig. 10 B. Seed pendulous. These are perennial plants or climbing shrubs.



Fig. 13.

GENERA AND SYNONYMES.

<i>Clematis</i> , L.	<i>Stylurus</i> , Raf.	<i>Triquadria</i> , Lind.	<i>Atragene</i> , DC.
<i>Clematopsis</i> , Boj.	<i>Trigula</i> , Nor.	<i>Viorna</i> , Pers.	<i>Naravclia</i> , DC.

TRIBE 2. *Anemoneæ*.—Calyx usually coloured; in æstivation imbricate, Fig. 11. Some with no petals, others with petals which are flat. Seed-vessels (carpels), not opening, one-seeded, sometimes terminated with a long bearded style. Seed, pendulous. These are herbaceous plants, with either the leaves alternate, or all proceeding directly from the root (radical).

GENERA AND SYNONYMES.

<i>Cyrtoryncha</i> , Nutt.	<i>Tetractis</i> , Sp.	<i>Anamenia</i> , Vent.	<i>Adonanthæ</i> , S.
<i>Thalictrum</i> , T.	<i>Anemone</i> , Hall.	? <i>Thebesia</i> , Neck.	<i>Callianthemum</i> ,
<i>Physocarpidium</i> ,	<i>Asteranemia</i> , Reh	<i>Hamadryas</i> , Comm.	[C.A.M.
[Reh.	<i>Hepatica</i> , Dill.	<i>Hydrastis</i> , L.	<i>Myosurus</i> , Dill.
<i>Anemonanthe</i> , S.	<i>Knowltonia</i> , Sal.	<i>Adonis</i> , Dill.	<i>Aphanostemma</i> , SH

TRIBE 3. *Ranunculeæ*.—Fig. 14. Calyx in æstivation imbricate (Fig. 11). Petals tubular at the point of insertion, two-lipped, furnished with a seale at the base of the interior side A. Seed-vessels (carpels) one-seeded, not opening, B. Seed erect. These are plants with a herbaceous stem, and with the leaves either alternate on the stem, or proceeding directly from the root.

GENERA AND SYNONYMES.

<i>Casalea</i> , St. H.	<i>Krapfia</i> , DC.	<i>Ceratocephalus</i> , Mö.	<i>Oxygraphis</i> , Bung.
<i>Ranunculus</i> , Hall.	<i>Cyprianthe</i> , S.	<i>Ficaria</i> , Dill.	

DIVISION II.—CARPELS MANY-SEEDED.

TRIBE 4. *Helleboreæ*.—Fig. 15. Calyx in æstivation imbricate, (Fig. 11.) Petals in some genera wanting; when present they are irregular, two-lipped and tubular, D. Seed-vessels (carpels) capsular, many-seeded, and opening on one side, c. All of these are herbaceous plants with alternate or radical leaves, with the exception of some species of *Pœonia*, which are half-shrubby.

GENERA AND SYNONYMES.

<i>Caltha</i> , L.	<i>Hagemone</i> , Bunge.	<i>Thalictrælla</i> , A.R.	<i>Aconitella</i> , Spach.
<i>Nirbisia</i> , G. Don.	<i>Eranthis</i> , Sal.	<i>Enemion</i> , Raf.	<i>Phledinium</i> , Spa.
<i>Thacla</i> , Spach.	<i>Koellia</i> , Biria.	<i>Coptis</i> , Sal.	<i>Aconitum</i> , T.
<i>Psychrophila</i> , Gay.	<i>Robertia</i> , Merat.	<i>Garidella</i> , T.	<i>Glaucidium</i> , Zucc.
<i>Trollius</i> , L.	<i>Anemonopsis</i> , Zucc.	<i>Nigella</i> , T.	<i>Pœonia</i> , T.
<i>Geisenia</i> , Raf.	<i>Helleborus</i> , Ad.	<i>Aquilegia</i> , T.	<i>Moutan</i> , Lindl.
<i>Barnoudia</i> , Gay.	<i>Isopyrum</i> , L.	<i>Delphinium</i> , T.	

TRIBE 2. *Acæææ*.—Calyx in æstivation imbricate, Fig. 11. Petals flat, or wanting. Fruit succulent, unopening, and with one or many seeds.

GENERA AND SYNONYMES.

Trautvetteria, <i>F&M</i>	Macrotis, <i>Raf.</i>	Cimicifuga, <i>L.</i>	Zanthorhiza, <i>Hr</i>
Actæa, <i>L.</i>	Actinospora, <i>Turcz.</i>	Xanthorrhiza, <i>Msh.</i>	Podophyllum, <i>L.</i>
Botrophis, <i>Raf.</i>	Pityrosperma, <i>Sieb</i>		

GEOGRAPHICAL DISTRIBUTION.—The Ranunculaceæ are found distributed over the whole surface of the globe. They are abundant in the cold and temperate climates of the northern hemisphere; frequent in Europe, from the shores of the Mediterranean to the Arctic regions; from the sea-shore to the snow range of the mountains; more rare in America, and still more so in temperate Asia. They are pretty numerous in the southern hemisphere, but rarely between the tropics, except at high altitudes on the sides and summits of mountains.

PROPERTIES AND USES.—All the Ranunculaceæ are more or less acrid and poisonous. This acridity, which exists in almost all the parts of these plants, appears to depend on a volatile principle, which is easily destroyed by the effect of boiling water, or even simply by drying. It is much more energetic in the roots than in the exterior parts, whence it is dissipated in the air, or in the surrounding water, although, in certain cases, even these exhibit it in a very high degree, as in the Monkshoods, from the flowers of which bees are said to have collected poisonous honey. Nevertheless, this destructive or injurious principle loses as much by drying as by ebullition, for which reason, certain species strongly poisonous in the fresh state, may serve when cooked as food to man, or may be given with impunity to cattle in the state of fodder. Thus the young shoots of *Clematis vitalba* are eaten in Piedmont, and the leaves of *Ficaria ranunculoides*, or *Lesser Celandine*, are used as a pot-herb in some parts of France.

The *Clemauidææ* possess the acrid principle in a very eminent degree, perhaps even more so than either the *Anemoneæ* or *Ranunculeæ*. If the fresh leaves of *Clematis vitalba*, or *Traveller's Joy*, are chewed, there will be found in the mouth a sensation of heat and smarting, and frequently the tongue is covered with small vesicles, which turn to ulcers. This taste and that action are, nevertheless, much less in the dried plant. If the fresh leaves bruised are applied to any part of the body, an active inflammation ensues, followed by hard swellings, which terminate in ulcers; hence beggars frequently employ this as a means for creating artificial sores on their limbs to excite pity. Taken internally, the juice or extract produces all the symptoms of poisoning by the acrid poisons. In Madagascar the *C. Mauritianæ* is used instead of cantharides.

The *Anemoneæ* possess very nearly the same properties as the *Ranunculeæ*. *A. pulsatilla*, and, indeed, all the other species of *Anemone*, are extremely acrid in all their parts. It causes, when applied externally or introduced into the stomach, all the effects of acrid and corrosive substances, as violent inflammation and a stupefying action on the nervous system. It furnishes a popular medicine among the homœopaths under the name of *Pulsatilla*; and the distilled water causes vomiting. The juice of the petals stains paper a green colour. *A. pratensis* when chewed corrodes the tongue, and is also said to contain a camphoraceous matter, which

is obtained in the form of crystals, very acrid and very inflammable. The *Hepatica* is considered simply as an astringent. The roots of *Thalictrum flavum* dye wool yellow; the leaves raise blisters on the skin; and in Buckinghamshire the peasantry boil the root and tops in ale, which being drank acts as a strong purgative. The roots of *Hydrastis Canadensis* are intensely bitter, and said to possess tonic qualities; and they yield a beautiful dye, whence the plant is called by the Canadians *Yellow Root*, and *Orange Root*. *Knowltonia vesicatoria* is remarkable for its blistering properties. We are informed by Thunberg, that the leaves are used by the country people at the Cape instead of cantharides. Bruised, and applied to any part of the body, in the space of half an hour they raise a large blister, which keeps open a long time. The root, cut into slices, and applied to any part of the body, draws so powerfully, that, if it lies on all night, the sore will keep open for a month.

Of the *Ranunculeæ*, *R. bulbosus*, *acris*, *sceleratus*, *flamula*, *auricomus*, *thora*, *arvensis*, and many others, have very powerful acrid properties; and their fruits, when green, appear to be the parts in which this acidity is most intense. If the fresh-bruised leaves are applied to any part of the body a more or less active inflammation will soon appear, followed with hard swellings, which will speedily become a true blister. Recourse may, therefore, be had to these plants, as is the case in Norway and the Highlands of Scotland, when cantharides cannot be obtained, or when the irritant action of these on tender parts would be injurious. Taken internally, the juice or extract of *Ranunculus acris*, causes an intense inflammation of the digestive organs, and if the dose has been considerable, it is a true acrid poison, followed by very serious results, and even death. The juice of *R. bulbosus* applied to the nostrils causes sneezing, and a portion of the root has been found to act beneficially on the gum of an aching tooth. Haller informs us that the Swiss hunters chew *R. alpestris* as a restorative after fatigue, and as an antidote to giddiness; and Withering states that in the case of poison having been taken, *R. flamula*, which produces instantaneous vomiting, is preferable to any medicine. With the juice of *R. thora* the Swiss hunters were wont, formerly, to poison their darts, by means of which the wounds inflicted on wild beasts were speedily fatal and incurable. The distilled water of *R. sceleratus* is eminently acrid, and, when cold, deposits crystals, which have been found



Fig. 14. *Ranunculus repens*.

to be utterly insoluble, and of an inflammable nature; yet, notwithstanding its poisonous properties, it is eaten when cooked by the shepherds of Wallachia. *R. aquatilis* forms an exception to all just mentioned, having been found to be not only innoxious, but nutritious to cattle. Dr. Pulteney says, that in the neighbourhood of Kingswood, on the borders of the Avon, cottagers support their cattle almost entirely on this plant. They collect a quantity every morning, and bring it in a boat to the edge of the water, where the cows eat it with great avidity. One man kept four cows and one horse so much upon it, that they had not consumed more than half a ton of hay throughout the whole year. There is no doubt that the continued immersion in the water is the cause, as we have already stated, of the destruction of the acrid principle in this plant. *R. repens*, or Butter-cup, Fig. 14, has less of the acrid quality than most of the genus, and is said to be eaten as a potherb. Cattle, however, do not feed on it willingly, and yet in many grass fields it makes a considerable part of the pasturage. *Picaria ranunculoides* is also less acrid than some of the others; but although its leaves are used as a potherb when cooked, yet its roots are acrid and bitter, and have been recommended as a cure for hemorrhoids, and hence called *Pilewort*. It is said that wood-pigeons eat the root with great avidity, and its growth is sometimes encouraged in the vicinity of gardens to prevent their depredations in winter.

The Helleboreæ appear to possess the most powerfully poisonous properties of the whole family. In all its parts, but particularly in its leaves and roots, the *Aconitum napellus*, or Common Monkshood, Fig 16, is found extremely acrid. Placed in contact with the tongue any portion of them excites a painful feeling of smarting, and a very considerable secretion in the salivary glands. The great number of accidents caused by the careless use of the root of Monkshood sufficiently indicate its deleterious action; and Mr. Orfila, after a great number of experiments, came to the conclusion, that the juice of the leaves introduced into the stomach, the rectum, or the cellular tissue, caused serious injury, followed by speedy death. The root

acts with still greater effect. The aqueous extract prepared with the expressed juice of fresh leaves, and particularly the alcoholic extract, acted with the same poisonous properties. These different preparations are absorbed, act on the nervous system, and in particular on the brain, causing a

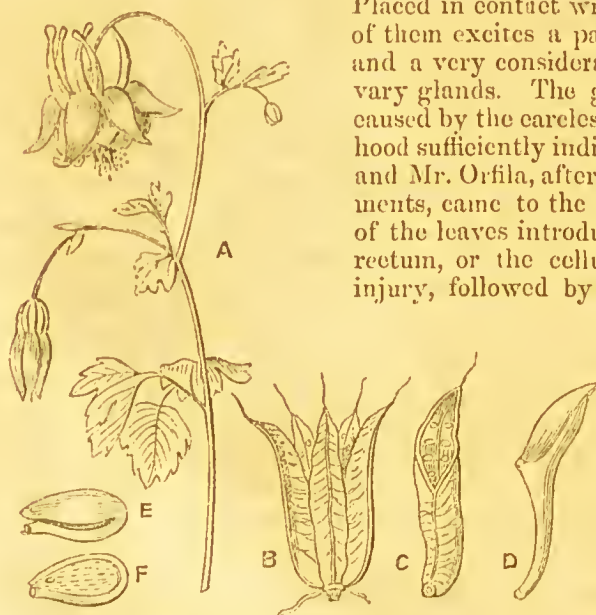


Fig. 15. *Aquilegia canadensis*.

sort of mental alienation, besides inducing a local irritation in the organs

to which they have been applied. Instances are known where persons having taken the effluvia of the plant in full flower by the nostrils have been seized with swooning fits, and had lost their sight for three or four days. It was but recently that a painful accident occurred with this plant, by which four gentlemen were poisoned at Dingwall, three of whom died from the effects; and which was caused by a servant ignorantly digging the root of Monkshood, and serving it at dinner for Horse Radish. It is said that goats will die from eating this plant; but that horses are not affected by it. In Sweden a decoction or powder of the root of *A. lycoctonum* is used for destroying flies and other insects, and in Medelpadia, Linnaeus says, the roots are eaten without injury. The acrid principle which is found in the Monkshoods was discovered by M. Brandes to be an alkali, which has been named *Aconitina* or *Aconitine*. In the hands of the skilful practitioner Aconitine has been advantageously employed, administered internally, in chronic rheumatism, gout, exostosis, anaurosis, scrofula, cancer, intermittents, itch, and other diseases. The juice of *Caltha palustris*, or Marsh Marigold, boiled with alum, stains paper yellow; and Boerhaave says, that if kine eat the plant it occasions such an inflammation that they generally die. In some parts of Germany the young buds are pickled, and sold as capers. Withering states, in support of the opinion that gaseous exhalations from plants during night are often fatally mephitic, that on a large quantity of the flower of Marsh Marigold being put into the bedroom of a girl who had been subject to fits, the fits ceased. The root of *C. Bisma* is truly poisonous, and is used by the inhabitants of Nepaul, near the river Kosi, to poison their darts; and they regard it as their most powerful means of repelling the invasions of their enemies, by the facilities with which they can empoison water with it. *C. Codua* is even more poisonous than the last, and is used by the same people (the Corkhalese) for the same purpose. In Sweden the people strew their doors and pavements on holidays with the flowers of *Trollius Europæus* (Fig. 17), which have a pleasant smell, as do also those of Westmoreland and some parts of Scotland, where they go out in parties to gather them for the decoration, not only of their doors and apartments, but also for garlands to decorate their persons. According to Kalm a decoction of the whole plant is said to cure scrofula. *Helleborus niger*, Black Hellebore, or Christmas Rose, is one of the most

Fig. 16. *Aconitum napellus*.

powerful drastic purgatives, the use of which may be followed by very serious results; but in smaller doses it is diuretic and emmenagogue, and by some considered as an alternative. It has been much recommended in mania, melancholy, dropsy, scabies, and worms; and when taken in too large doses, it causes violent vomitings, inflammation of the stomach, vertigo, tremblings, convulsions, cramps, and death. *H. foetidus*, a native of England, though of less powerful properties than the Black Hellebore, is violently cathartic. The leaves, when dried, are a popular remedy against worms; but great caution is necessary in their administration, as instances of fatal effects have been recorded. The root of *Coptis trifolia* affords an agreeable and powerfully stomacheic bitter, and is much used in America as a local application for *thrush* in children. The leaves and stalks are used by the Indians to dye of a fine yellow colour several kinds of work made of skins; and with them the French also dye wools of a yellow colour. The seeds of *Nigella sativa* have a piquant and acrid flavour, somewhat analogous to that of pepper; and they are used in Germany and Asia as a spice for seasoning dishes. The species of *Aquilegia*, or Columbines, though not possessing the same virulent properties of those already mentioned, still belong to the same family, and are to be regarded with suspicion. A tincture of the flowers of *A. vulgaris* has been recommended as antiphlogistic, for strengthening the gums, and for scorbutic ulcers in the mouth; but Linnæus states that, given internally, he has known children lose their lives from an overdose of it. From the seeds of *Delphinium staphisagria*, or Stavesacre, an alkaloid substance, called *Delphine*, is extracted, which exerts violent poisonous properties in very small doses, acting chiefly on the nervous system. The seeds of the plant are so violently emetic and cathartic as never to be administered internally, but are principally applied to some kinds of cutaneous eruptions, and in powder for destroying the pediculi of the head; a strong tincture has also been used with advantage as an embrocation in rheumatic affections. In some countries the seeds are used to intoxicate fish in the same manner as *Cocculus indicus*. The roots of *Pæonia officinalis*, or Common Peony, when fresh, have a strong and nauseous smell, which they partly lose when dried. Among the ancients they were held in high repute as powerful antispasmodics, and as one of the most efficacious remedies against epilepsy, convulsions, and hysteria; but they are now totally disregarded for any medical properties they may have been supposed to possess.

The *Actææ* are the least dangerous of this remarkable family; but even some of them must be used with caution. The berries of the *Actæa spicata*, or Baneberry, are poisonous, and the root astringent. The juice of the berries mixed with alum furnishes a black die, and the root has been found useful in some nervous affections. *Botrophis actæoides* (*A. ramosa*) is simply astringent, and the root is considered by the Americans as an antidote to poison and the bite of the rattlesnake. It is called by them *Black Snake-root* or *Cohosh*, and is frequently used by the practitioners of the United States. Dr. F. N. Johnson, of New York, has employed it with extraordinary success in acute rheumatism, the disease generally yielding completely to the remedy within eight or ten days. It may be given either in substance, decoction, or tincture. The dose of the powder is from a scruple to a drachm. An ounce of the bruised root may be boiled for a

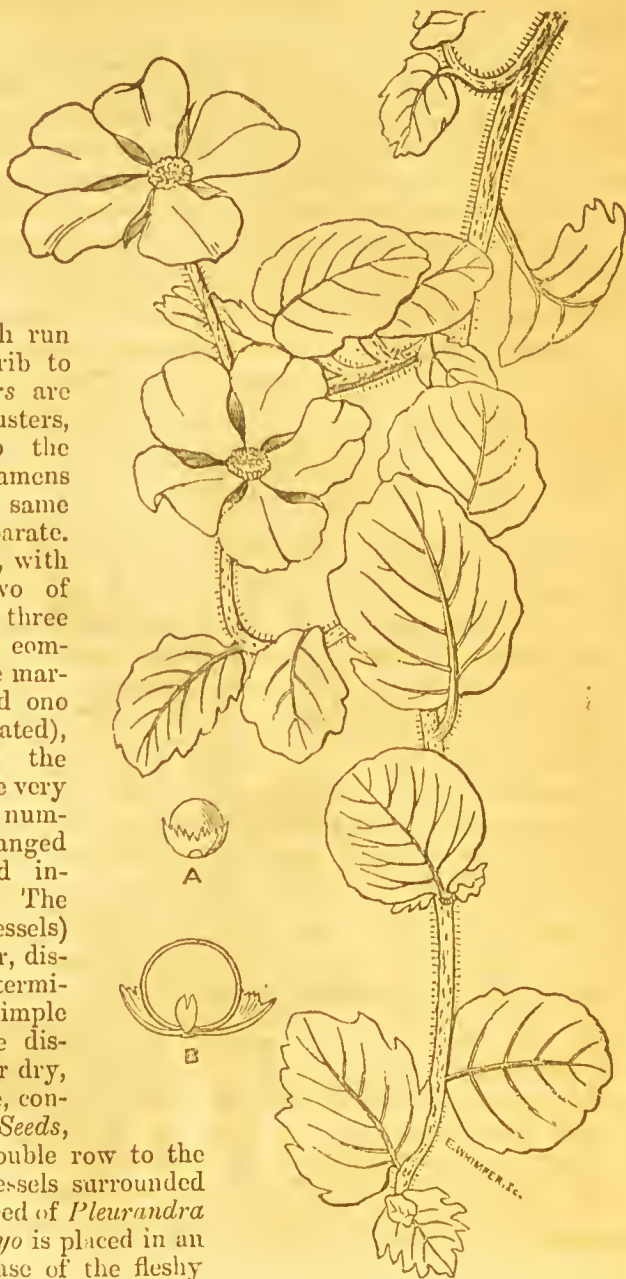
short time in a pint of water, and one or two fluid ounces given for a dose, and from half-a-pint to a pint of this decoction may be taken throughout the day without inconvenience. The tincture may be made in the proportion of four ounces to the pint of diluted alcohol, and given in the dose of one or two fluid drachms. In acute rheumatism the remedy is recommended by Dr. Davis, in the dose of from thirty to sixty drops of the tincture, or twenty grains of the powder, repeated every two hours till its effects are observed. The wood and bark of *Xanthorrhiza apifolia*, called *Yellow Root* by the Americans, furnish an excellent tonic bitter, such as Colombo, Quassia, and other simple tonics. The leaves of *Podophyllum peltatum*, or *May Apple*, are said to be poisonous; but the fruit, which has a subacid, sweetish taste, may be eaten with impunity: from its colour and shape it is sometimes called by the Americans *Wild Lemon*. The root is a certain and active cathartic in its operation, resembling that of jalap, but is rather slower, and is thought by some to be more drastic. It is much used in various parts of America, combined with calomel, in bilious fevers and congestion of the liver.



Fig. 17. *Trollius Europæus*—Globe Flower.

ORDER II.—DILLENACEÆ—THE DILLENIA FAMILY.

THIS order is composed of trees, shrubs, or under-shrubs, some of which are climbing. The *Leaves* are alternate, very rarely opposite, simple, without leaflets at their base, which is frequently widened and forms a sheath round the stem; they are rough and leathery, sometimes entire and sometimes toothed, and furnished with strong veins which run straight from the mid rib to the edge. The *Flowers* are either solitary or in clusters, sometimes opposite to the leaves. In some the stamens and pistils are in the same flower, and in others separate. The *Calyx* is permanent, with five deep segments, two of which are exterior, and three interior. The *Corolla* is commonly of five petals, the margins of which are placed one over the other (imbricated), and inserted beneath the ovary. The *Stamens* are very numerous, indefinite in number, either distinct or arranged in several bundles, and inserted under the ovary. The *Ovaries* (young seed-vessels) are indefinite in number, distinct, one-celled, each terminated by a style or simple stigma. The *Fruits* are distinct or united, fleshy or dry, and opening on one side, containing one or many *Seeds*, which are fixed in a double row to the inner edge of the seed-vessels surrounded by a pulpy aril, Fig. A, (seed of *Pleurandra furfuracea*.) The *Embryo* is placed in an erect position on the base of the fleshy albumen, Fig. B.

Fig. 18. *Hibbertia grossulariæfolia*.

This family is divided into two tribes—Delimeæ and Dilleneæ.

TRIBE 1. Delimeæ.—Filaments of the stamens widened at the apex, bearing on both sides the cells of the anthers, which are separated. These are chiefly natives of America, few of them being found in Asia and tropical Africa.

GENERA AND SYNONYMES.

Curatella, <i>L.</i>	Othlis, <i>Seht.</i>	Tigareca, <i>Aubl.</i>	Trachytella, <i>DC.</i>
Pinzona, <i>M. & Z.</i>	Empedoclea, <i>St. H.</i>	Rhinium, <i>Schrb.</i>	Actica, <i>Lour.</i>
Doliocarpus, <i>Rol.</i>	Davilla, <i>Velloz.</i>	Euryandra, <i>Forst.</i>	Calligonum, <i>Lour.</i>
Calinea, <i>Aubl.</i>	Hieronina, <i>Fl. Fl.</i>	Assa, <i>Houtt.</i>	? Recchia, <i>Moc. &</i>
Soramia, <i>Aubl.</i>	Delima, <i>L.</i>	Wahlbonia, <i>Th.</i>	Sess.
Mappia, <i>Schreb.</i>	Tetracera, <i>L.</i>	Rohlinia, <i>Dnst.</i>	

TRIBE 2. Dilleneæ.—Filaments of the stamens not widened at the apex, bearing on both sides the cells of the anthers, which are elongated and strong. These are natives of Asia and Australia.

GENERA AND SYNONYMES.

Capellia, <i>Bl.</i>	Trichostigma, <i>St.</i>	Adrestia, <i>DC.</i>	Candollea, <i>Lab.</i>
Colbertia, <i>Sal.</i>	Wormia, <i>Rottb.</i>	Hibberta, <i>Andr.</i>	Pachynema, <i>R. Br.</i>
Reifferscheidia, <i>Prl.</i>	Clugnia, <i>Comm.</i>	Burtonia, <i>Sal.</i>	Hemistemma, <i>Com.</i>
Dillenia, <i>L.</i>	Lenidia, <i>Thou.</i>	Cistomorpha, <i>Cly.</i>	Aglaja, <i>Nor.</i>
Syalita, <i>Ad.</i>	Schumacheria, <i>Vhl.</i>	Pleurandra, <i>Lab.</i>	Acrotrema, <i>Jack.</i>
Actinidia, <i>Lindl.</i>	Pleurodesmia, <i>Ar.</i>		

GEOGRAPHICAL DISTRIBUTION.—The majority of the Dillenia family are found in Australia, the East Indies, and the tropical parts of South America.

PROPERTIES AND USES.—The whole of this family possess more or less of astringent properties. *Curatella sambaiba* is used in the Brazils for tanning skins and also as a decoction for washing wounds, and the leaves of *C. americana* are so rough that they are used in Cayenne for polishing wood. The Brazilians also use the pliant stems of *Davilla rugosa* to make bands, and a fomentation of the leaves for allaying swellings of the legs, so common in hot countries. In Minas Novas the natives wash wounds with a decoction of the inner bark of *D. elliptica*, which they call *Cambuinha*. *Tetracera tigarea* and *tomentosa* are called in Cayenne *Liane rouge*, from the decoction colouring water of a red colour, and are considered by the natives as antispythitic and diuretic. The fruit of *Dillenia speciosa* is eatable though very acid, and requires sugar, broth, or some other addition, to make it palatable. The acid juice of the fruit with sugar is used in India, mixed with water, as a cooling beverage in fevers; and when the fruit is added to the syrup, Rheede says it is considered useful as a cough mixture. The ripe fruits are said to be laxative, and even to produce diarrhœa. The young calyxes of *D. serabella* and *speciosa* are used in curries by the inhabitants of Chittagong and Bengal on account of their pleasant acid taste; and the fruit of *D. elliptica* is eaten either in a crude state, or, when ripe, used as a sauce with fish by the natives of Amboyna. The foliage of many of the species of this family is so extremely rough that it is used in Europe for the same purposes as fish-skin and sand-paper, while in China the leaves of *Trachytella aspera* are employed even for polishing metals.

ORDER III.—MAGNOLIACEÆ—THE MAGNOLIA FAMILY.

HERE we meet with some of the most beautiful trees and shrubs which have been introduced to European gardens. The *Leaves* are simple, alternate, often thick and leathery, with or without pellucid dots, furnished

with leaflets at the base of the leaf-stalk, which envelop the young leaves before they open, but soon fall off. The *Calyx* is composed of from three to six distinct segments, that are sometimes coloured, and which fall off at an early period after opening. The *Petals* vary from three to twenty-seven, arranged in series of threes and are inserted at the base of an elongated receptacle. The *Stamens* are indefinite in number and free, inserted beneath the ovaries. *Ovaries* numerous, one-celled, very rarely



Fig. 19. *Magnolia Glauca*. A, pistil; B, fruit; C, seed.

solitary; they are either distinct, or very rarely united together, and each terminated by a simple style. *Fruit* composed of many seed-vessels, gathered together in heads, which are more or less united, dry, and quite closed, as in the Tulip-tree, or fleshy and opening, as in the *Magnolia*, Fig. B, and the seed suspended by a thread. The *Embryo* is minute, and situated at the base of a fleshy albumen, Fig. C.

TRIBE 1. *Illiciæ*.—Seed-vessels arranged in whorls, rarely solitary by abortion. The leaves full of pellucid dots.

GENERA AND SYNONYMES.

Tasmannia, <i>R. Br.</i>	Magallana, <i>Com.</i>	Skimmi, <i>Kæmpf.</i>	Trochodendron,
Drymis, <i>Forst.</i>	Canella, <i>Domb.</i>	Badianifera, <i>L.</i>	[<i>S. & Z.</i>
Wintera, <i>Murr.</i>	Boique, <i>Molin.</i>	Cymbostemon, <i>S.</i>	Gymnanthus, <i>Eng.</i>
Winterana, <i>Sol.</i>	Illicium, <i>L.</i>		? Temus, <i>Molin.</i>

TRIBE 2. *Magnoliæ*.—Seed-vessels arranged in a spiral on the elongated receptacle. Leaves destitute of pellucid dots.

GENERA AND SYNONYMES.

Talauma, <i>Juss.</i>	Magnolia, <i>L.</i>	Yulania, <i>Spach.</i>	Manglictia, <i>Bl.</i>
Blumia, <i>Nees.</i>	Gwillimia, <i>Rottb.</i>	Tulipastrum, <i>Spa.</i>	Michelia, <i>L.</i>
Aromadendrum, <i>Pl.</i>	Liriopsis, <i>Spach.</i>	Lirianthe, <i>Spach.</i>	Liriodendron, <i>L.</i>

GEOGRAPHICAL DISTRIBUTION.—The greatest number is found in North America, where in the forests and swamps of the United States the Magnolias are found principally to exist. Some are distributed throughout the West Indian islands; others are found in India, China, and Japan; but hitherto none of the species have been discovered on the continent of Africa, or on the islands adjacent.

PROPERTIES AND USES.—The Magnolia family are remarkable not only for their elegance of foliage, and the grandeur and delicious perfume of their flowers, but they also merit attention for their medicinal properties. Two principles are found to exist in almost all their parts; the one is aromatic, and more or less acrid and stimulant; the other, which is less frequent, is a powerful bitter.

Illiciæ.—It is chiefly in this tribe that the aromatic and stimulant principle is found. It exists principally in the bark of *Drymis*, and in the fruit and bark of *Illicium*, which the Chinese burn in their temples, and which we employ in medicine and as aromatics. Any portion of the plant of *Illicium floridanum* when bruised smells like anise, and the bark and leaves are strongly impregnated with a spicy aromatic taste and smell. This aroma is preserved in the distilled water, and fills the room with its fragrance where the distillation is carried on. The seed-vessels of *I. anisatum* are imported from China under the name of *Chinese Anise*, and is used as a condiment for flavouring dishes, and from it a great portion of what is called *Oil of Anise* is obtained. The whole plant is filled with a fine aromatic odour; from it the liqueur known as *Anisette de Bourdeaux* is flavoured. It is held in high estimation among the Japanese, who plant it near their temples, and as their idols are supposed to delight in it, branches of it are always put among other flowers in their temples in pots full of water. With the powder of the bark of the tree they measure time. A box twelve inches long is filled with ashes; small furrows are made in these ashes, from one end of the box to the other, and so on backwards and forwards to a considerable number. In these furrows is strewed some fine powder of the bark, and divisions are made for the hours. The lid of the box is then closed, but a small hole is left open in order to supply the fire with air. After the powder is set on fire, it consumes very slowly, and when the quantity in the furrow limited to an hour has been consumed, the hours are

proclaimed by sounding the bells of the temple. The plant is stomachic, and carminative, has a sweet, acrid, and aromatic flavour, which has some analogy with that of Anise and Fennel, and is used in eastern countries in cholic and rheumatism. The Chinese chew it after dinner as a stomachic and sweetener of the breath; and, in some parts of the East Indies the



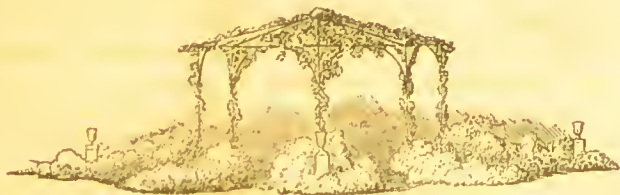
Fig. 20. *Drymis Winteri*.

Dutch settlers mix it with their tea and sherbet. The bark of *I. parviflorum* has a flavour exactly the same as that of Sassafras root. *Winter's Bark*, Fig. 20 (*Drymis Winteri*), is a stimulant aromatic tonic, and may be used for similar purposes as cinnamon and *Canella alba*, for the latter of which it is sometimes substituted; its odour is that of pepper and basil, and its flavour of a burning acidity adhering to the throat. It is said to be good in scurvy, vomiting, and paralysis; and it is also used for tanning. It was first brought to England from the Straits of Magellan in 1579 by Captain Winter, who went out with Sir Francis Drake in his voyage round the world. He found it very useful to his ship's crew both as a substitute for other spices, and as a cure for scurvy. The leaves, with other herbs, are said to have been used successfully in fomentations, and half a drachm of the bark boiled with some carminative seeds promoted

perspiration and relieved those suffering from scurvy. Other species of *Drymis*, as *granatensis* and *axillaris*, possess the same properties, and the fruit of *Tasmannia aromatica* is used as pepper by the settlers of Australia.

Magnoliææ.—These contain a tonic bitter principle. The bark and fruit of all the Magnolias are possessed of the same medicinal properties. The bark of *M. glauca* (Fig. 19) has a bitter and aromatic taste, somewhat similar to that of Sassafras and *Calamus aromaticus*. The aroma resides in a volatile portion, which is probably an essential oil, and is lost when the bark is in a dry state. It is an excellent tonic aromatic, and has been successfully applied in cases of chronic rheumatism and intermittent fever, to which the inhabitants of the marshy districts of North America are so liable. The flowers, which are fragrant, are said by Barton to be so stimulating as to produce paroxysms of fever, and even attacks of inflammatory gout. The leaves of *M. tripetala* are of a large size, from one to two feet long,

and being arranged on the ends of the branches in a circular form, this species has been appropriately called the *Umbrella Tree*. The fruit of *M. acuminata* grows to the length of three inches, and, from resembling a cucumber in shape, the inhabitants called it the *Cucumber Tree*. Its wood is of a fine grain and orange-coloured. *M. excelsa* is a native of Nepal, and the wood is highly prized in the neighbourhood of Patna for all kinds of joinery work, it being at first of a fine greenish colour, but changing to a fine yellow, and the grain very close; it is there sold under the name of *Champ*. The bark of *M. kobus* smells like camphor. *Michelia champaca* is a native of India, and is highly venerated by the Hindoos, by whom it is dedicated to their god Vishnu, and called *Tulasi*. The bark of *M. montana* has the same properties as that of *Cascarilla*; and that of *M. gracilis* smells strongly of camphor. *Aromadendron elegans*, found in Java, produces a valuable timber, and has a great local reputation as a stomachic; and in the same island the wood of *Manglietia glauca* is used for coffins, and is supposed to prevent the decomposition of the bodies. The fresh bark of *Liriodendron tulipiferum*, or Tulip Tree, has a heavy and rather disagreeable odour, and a bitter, pungent, and aromatic taste, which are weakened by keeping. It is a stimulant tonic, which has been used as a substitute for Peruvian Bark in intermittent fevers, and has proved highly serviceable in chronic rheumatism, and dyspepsia. The wood of this tree is smooth and fine-grained, very easily wrought, and not liable to split. It is used for various kinds of carving and ornamental work, and for articles of household furniture. Michaux says that the joinery and inside work of the houses in the western states of America are most frequently of this material.



ORDER IV.—ANONACEÆ—THE CUSTARD-APPLE FAMILY.

THE Custard-apple family is composed of trees and shrubs, and is distinguished from the Magnolias by having no leaflets at the base of the leaf-stalks. The *Leaves* are alternate, entire, rarely lobed, and without leaflets at their base. The *Flowers* are usually green or brown, either solitary or two or three together. The *Calyx* has three distinct segments,



Fig. 24. *Uvaria triloba*. A, entire fruit; B, section of the seed, showing the albumen pierced by the substance of the seed-coat, and the small embryo at the base.

united together at their base, and is permanent. The *Corolla* is composed of six petals, arranged in two series, the three interior often smaller and abortive. The stamens are numerous, rarely definite in number, distinct, inserted on the fleshy base of the flower (receptacle), which supports many one-celled *Ovaries*, which are generally collected together

in a great number in the centre of the flower, and are sometimes separate, sometimes connected. The *Fruit* consists of a great number of seed-vessels, which are either fleshy or dry, sometimes separate, and in other cases formed into a fleshy mass. The *Seeds* are one or more in each seed-vessel; the *embryo* is minute and straight, in the base of hard horny ruminating albumen.

TRIBE I. Bocageæ.

GENERA AND SYNONYMES.

Bocagea, <i>St. H.</i>	Orophea, <i>Bl.</i>	Milisia, <i>A. DC.</i>	Saccopetalum, <i>Ben.</i>
Poppowia, <i>Endl.</i>			

TRIBE II. Xylopesæ.

GENERA AND SYNONYMES.

Polyalthia, <i>Bl.</i>	Cœlocline, <i>A. DC.</i>	Mitrephora, <i>Bl.</i>	Trigyncia, <i>Schl.</i>
Xyloia, <i>L.</i>	Patonia, <i>Wight.</i>	Asimina, <i>Ad.</i>	Melodorum, <i>Lour.</i>
Bulliarda, <i>Neck.</i>	Uvaria, <i>L.</i>	Orchidocarpum,	Desmos, <i>Lour.</i>
Habzelia, <i>A. DC.</i>	Unoua, <i>L. f.</i>	[<i>L. C. R.</i>	Marentaria, <i>Nor.</i>
Waria, <i>Aubl.</i>	Krokeria, <i>Neck.</i>	Porcelia, <i>R. & P.</i>	Hexalobus, <i>A. DC.</i>

TRIBE III. Anonææ.

GENERA AND SYNONYMES.

Anaxagorea, <i>St. H.</i>	Cananga, <i>Aubl.</i>	Cardiopetalum,	Monodora, <i>Dun.</i>
Artabotrys, <i>R. Br.</i>	Aberemoa, <i>Aubl.</i>	[<i>Schl.</i>	Eupomatia, <i>R. Br.</i>
Guatteria, <i>R. & P.</i>	Oxandra, <i>A. Rich.</i>	Anona, <i>L.</i>	Lobocarpus,
	Duguetia, <i>St. H.</i>	Rollinia, <i>St. H.</i>	[<i>W. & Arn.</i>

GEOGRAPHICAL DISTRIBUTION.—The Custard-apple family are confined almost exclusively to the tropics, both of the Old and the New World.

PROPERTIES AND USES.—The whole of this family present an aromatic taste and smell, and their medicinal properties are similar to those of the *Magnolia* family. The flowers of many of them are very fragrant; while some have the reputation of producing fruits equal to the finest in the world, others produce fibrous substances, which are used as cordage. The wood, bark, and berries of *Xylopiæ glabra* have an agreeable bitter taste, not unlike that of an orange-seed. The wild pigeons feed much on the berries, and owe that delicate bitterish flavour, so peculiar to them in the season, wholly to this part of their food. The bitter quality of this tree is communicated with great facility; for a handful of the shavings immersed in water, and immediately taken out again, will render it of a very bitter taste. Sugar, sent over in hogsheads made of this wood, was found to be so bitter that no one would buy it. Articles of furniture made of it are proof against insects; and carpenters who work it perceive a bitter taste in their mouths and throats. It is called *Bitter-wood* in Jamaica. *X. sericea* is a large tree, found in the forests near Rio Janeiro, and called *Embiza* and *Pindaiba*; it, and *X. pubescens*, furnish a tough and fibrous bark, which is used for making cables and cordage; the former has a highly aromatic fruit, which smells like a pear, and has an agreeable flavour of pepper; while the leaves and wood of the latter are very aromatic, and used by the natives of Guiana instead of that condiment. *Uvaria tripetaloides* exudes from its bark a fragrant gum; and the fruit of *U. febrifuga* furnishes to the Indians on the Orinoco a very excellent febrifuge. The *Lance-wood* of commerce is stated by Schomburgk to be obtained from *Duguetia quitarensis*, called *Yari-yari*, in Guiana.

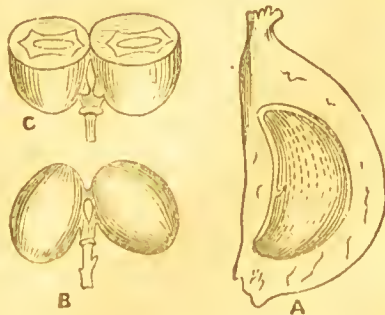
Of the true Custard-apples *Anona muricata*, or *Sour-sop*, grows abundantly in Jamaica; the fruit is large, succulent, and somewhat similar in flavour to black currants, being a mixture of sweet and acid, and is very agreeable and cooling. It is much used among the negroes, but being so common, the wealthier classes disregard it. *A. cherimolia* furnishes that delicious fruit of the Peruvians called *Cherimoyer*, which Humboldt speaks of so highly, and which is said to be the finest fruit in the world after the Mangosteen. It is of considerable size, often weighing four pounds or even more; of an irregular heart-shape, and pale greenish-yellow colour. The eatable part is a soft pulpy matter of the consistence of a custard, which forms almost the entire mass of the fruit. The *Sweet-sop* is found both in the East and West Indies, and is the fruit of *A. squamosa*, the size of an artichoke, and of a green colour. The pulp, which is enclosed in a thin velvety skin, and surrounds the seeds, is sweet, of a mealy nature, and an agreeable taste. It is indigenous to Brazil, where it is called *Pinha*, and highly esteemed for its odour and sweet musky aromatic flavour, which somewhat resembles that of cinnamon. It is used both raw and cooked, but in those parts of the East and West Indies where it is extensively cultivated it is always eaten raw, and the flavour said to be delicious, and the most agreeable of all the species of this genus. In the dessert it forms a pretty variety of colour, being always of a fine bright green, even when very ripe. The *Common Custard Apple* is the fruit of *A. reticulata*, and is about the size of a tennis-ball. It is a native of Brazil, where it is called *Con-lissa*, and is cultivated both in the East and West Indies; but it is more highly esteemed in the islands of the Eastern Archipelago than in the tropical parts of America. This may probably arise from being a different variety to that grown in America, as there are two or three distinct forms of it. Those which are grown in the East are so luscious and cloying that rarely more than one of them can be eaten at a time. They are not allowed to hang on the tree till they ripen, but are prematurely gathered and kept in rice for several days till they are fit for use. The fruit when eaten is broken into three or four pieces, the pulp sucked from the skin, and the seeds rejected. The Custard Apple is generally wholesome, except to those with weak stomachs, to whom they are not recommended. Two or three years ago there was an importation of Custard-apples from Madeira, as a speculation, in the hope that they might become an article of consumption in this country; but whether it was from the dark and not over-attractive exterior of the fruit, or from the price of 3*d.* or 4*d.* at which they were sold not being sufficiently low to permit them to be generally used, it was found to be a failure, and has not since been repeated. But as they are produced in that island so abundantly, and of such excellent quality, we cannot doubt but if they were introduced and sold at the same price as oranges are from the same quarter, the public would take them, and the trade would prove remunerative. The fruit of *A. palustris* is of an agreeable taste, but is said to be a strong narcotic, and therefore not eaten. It is called in Jamaica *Alligator apple* and *Cork wood*, the wood being so soft, even when dry, that it is frequently used by the negroes instead of corks to stop their jugs and calabashes; and the branches are used for the same purpose in Brazil. The *Monodora myristica*, or Calabash Nutmeg, is cultivated in Jamaica, and, like the true nutmeg, is highly aromatic.

ORDER V.—MENISPERMACEÆ—THE MOON-SEED FAMILY.

THIS family is composed of creeping and climbing shrubs, with alternate and generally simple leaves, without leaflets at their base, and rarely compound. The *Flowers* are small, and unisexual. *Calyx* with from three to six segments arranged in alternate series, and the external ones smaller than the internal. *Petals* from six to nine, generally arranged in rows of three each. *Stamens* in the male flowers, numerous; either distinct or united together in bundles, and forming a central column. *Ovaries*, in the female flowers, numerous, one-celled, distinct, or more or less united. *Fruit* fleshy; one or many seeded, sometimes composed of many berries united toge-



Fig. 22. *Sphærostema propinqua*. A, carpel of *Menispermum canadense*, shewing the curved ovule; B, two of the three ovaries which compose the fruit; C, the same cut horizontally.



ther. *Seeds* with or without albumen. *Embryo* curved or straight.

TRIBE 1. *Schizandrææ*.—Fig. 22 D. Flowers monœcious or dioecious. Ovaries numerous, seated on a long slender receptacle; albumen, fleshy; embryo straight. Leaves simple. By some botanists this forms a separate order.

GENERA AND SYNONYMES.

Kadsura, <i>Juss.</i>	Schizandra, <i>L. C. R.</i>	? Mayna, <i>Aubl.</i>	Sphærostema, <i>Bl.</i>
Sarcocarpum, <i>Bl.</i>	Hortonia, <i>Wight.</i>		

TRIBE 2. Lardizabaleæ.—Fig. 23. Flowers usually diœcious. Ovaries numerous, distinct, many-seeded, and one or many-celled. Leaves, compound. By some this is considered a distinct family.

GENERA AND SYNONYMES.

Burasaia, <i>Thou.</i>	Stauntonia, <i>DC.</i>	Lardizabala, <i>R. & P.</i>	Thouinia, <i>Domb.</i>
Akebia, <i>DC.</i>	Paryatia, <i>DC.</i>	Boissiera, <i>Domb.</i>	Boquila, <i>DC.</i>
Holboellia, <i>Wall.</i>			

TRIBE 3. Menispermæ.—Fig. 22. A, B, C. Flowers usually diœcious. Ovaries numerous, distinct, one-celled, one-seeded. Leaves simple.

GENERA AND SYNONYMES.

Cocsinium, <i>Col.</i>	Pselium, <i>Lour.</i>	Limacia, <i>Lour.</i>	Chondodendron, <i>R.</i>
Pereira, <i>Lindl.</i>	Ileospermum, <i>Mrs.</i>	Fibraurea, <i>Lour.</i>	[§ P.]
Anamirta, <i>Col.</i>	Homocnemis, <i>Mrs.</i>	Cebatha, <i>Forsk.</i>	Anclasma, <i>Mrs.</i>
Odontocarya, <i>Mrs.</i>	Stephania, <i>Lour.</i>	Ievba, <i>Forsk.</i>	Abuta, <i>Pöpp.</i>
Tinospora, <i>Mrs.</i>	Clypea, <i>Bl.</i>	Columbra, <i>Com.</i>	Trichoa, <i>Endl.</i>
Jateorhiza, <i>Mrs.</i>	Cyclea, <i>W. & Arn.</i>	Bagalatta, <i>Reb.</i>	Batschia, <i>Th.</i>
Chasmanthera, <i>Hst.</i>	Cissampelos, <i>L.</i>	Nephoica, <i>Mrs.</i>	Trichoa, <i>Pers.</i>
Calycocarpum, <i>Nt.</i>	Antizoma, <i>Mrs.</i>	Nephroia, <i>Lour.</i>	Tinomiscium, <i>Mrs.</i>
Parabœna, <i>Mrs.</i>	Rhaptomeris, <i>Mrs.</i>	Ferrandia, <i>Goud.</i>	Pyenarrhena, <i>Mrs.</i>
Anomospermum, [Mrs.]	Cocculus, <i>DC.</i>	Holopeira, <i>Mrs.</i>	Antitaxio, <i>Mrs.</i>
Abuta, <i>Barrer.</i>	Abuta, <i>Aubl.</i>	Diploclisia, <i>Mrs.</i>	Coccoderma, <i>Mrs.</i>
Agdestis, <i>M. & S.</i>	Baumgartia, <i>Mö.</i>	Hyperbœna, <i>Mrs.</i>	Clambus, <i>Mrs.</i>
Menispermum, <i>T.</i>	Androphylax, <i>W.</i>	Pleogyne, <i>Mrs.</i>	Detandra, <i>Mrs.</i>
Trilophus, <i>Fsh.</i>	Wendlandia, <i>W.</i>	Botryopsis, <i>Mrs.</i>	Jödes, <i>Bl.</i>
Pericampylus, <i>Mrs.</i>	Braunea, <i>W.</i>	Pachygone, <i>Mrs.</i>	Natsiatum, <i>Ham.</i>
Hypserpa, <i>Mrs.</i>	Tiliacora, <i>Col.</i>	Seiadotenia, <i>Mrs.</i>	Phytocrene, <i>Wall.</i>
	Epibaterium, <i>Fst.</i>		

GEOGRAPHICAL DISTRIBUTION.—The individuals of this family are found distributed throughout both the tropical and temperate regions of both the Old and the New World. The Lardizabaleæ inhabit the cooler parts of South America and the temperate parts of China, *Burasaia* only being found between the tropics. The Schizandreæ are found in India, the islands of the Indian Ocean, Japan, and the warmer parts of North America; while the Menispermæ are found plentifully between the tropics of Asia and America, but rarely in Africa; one is met with in Siberia, and a few in Japan.

PROPERTIES AND USES.—The greater part of this family abounds more or less in bitter properties. The Schizandreæ contain vegetable mucus only. The fruit is quite insipid, and very rarely eaten; that of *Kadsura japonica* is, according to Siebold, viscid and tasteless, and the Japanese boil the branches from which to obtain a sort of mucilage which they employ in the manufacture of Broussonetia paper; and by the women to cleanse their hair of the pomatum they apply so freely. The Lardizabaleæ are also without any bitterness; the berries are mucous and eatable. The fruits of *Holboellia latifolia* and *H. angustifolia*, the pulp of which is sweetish but otherwise insipid, are eaten by the natives of Nepal. Those of *Stauntonia*

hexaphylla are also insipid, but are eaten by the Japanese, by whom the juice is applied in cases of ophthalmia; they also use the fruit of *Akebia quinata* as an emollient medicine. The fruits of *Lardizabala* being sweet and grateful to the taste are eatable, and gathered for sale in the markets by the natives of Peru and Chili. The branches are very tough, and by passing them through the fire and then leaving them for some hours in water, they are employed in Chili as cordage.



Fig. 23. *Lardizabala biternata*.

In the *Menispermææ* it is that the active properties are found. Many of the species contain a bitter principle, which is often considerably subdued and enfeebled by the presence of a great quantity of starch; some are active narcotics, which, when found in excess, renders them poisonous; and a few are mucilaginous. The natives of Colomba cut the wood and bark of *Coscinium fenestratum* into thin slices, steep it in water for several hours, and then swallow it, with the liquid, regarding it as an excellent stomachic. *Anamirta cocculus* (*Cocculus suberosus*) furnishes the *Cocculus Indicus* of commerce. It was known to the Arabian physicians, and was for a long period imported into Europe from the Levant, and hence called *Cocculus levanticus*; but is now brought exclusively from the East Indies.

This drug is the berry of the plant, and is about the size of a pea,—black and wrinkled externally, containing a shell, which opens in two halves, and encloses a whitish, oily, and very bitter kernel. In India it is made up into a paste and thrown into the water, for the purpose of stupefying fish in order to take them; and is no doubt largely used in this country in the manufacture of malt liquors, to communicate intoxicating qualities, although forbidden by law. When used medicinally it acts like other acrid narcotic poisons, but is never given internally. The powdered fruit, mixed with oil, is employed in the East Indies as a local application in cases of obstinate cutaneous affections; and an ointment made with the powder has been used in ringworm, and to destroy vermin in the hair. The bitter principle is due to the presence of a vegetable alkali, called *Picrotoxin*, which is white and crystallizable in quadrangular prisms. It is poisonous, and, given to strong dogs in the quantity of five or ten grains, produces

death, preceded by convulsions. Besides Picrotoxin, *Cocculus indicus* contains a large proportion of fixed oil, and other substances of less interest. In the shell two distinct principles have been discovered, one alkaline, and named *Menispermin*; and the other, though identical in composition, is without the alkalinity, and called *Paramenispermin*. Other species of *Cocculus* are said to furnish this drug; such are *C. Plukenetii*, *C. lacunosus*, and *C. flavescens*, all of which possess the same narcotic properties, and are applied to the same uses. *C. peltatus* is used in Malabar in the cure of dysentery and hemorrhoids. *C. cordifolius* and *C. (Tinospora) crispus* are tonic and febrifuge, and used in the east to cure ulcers, the jaundice, and gripings. *C. cinerascens* and *C. (Botryopsis) platyphylla* are both used by the Brazilians in the treatment of intermittent fevers, and as powerful specifics in diseases of the liver. The roots of *C. fibraurea* are diuretic; the bruised stems afford, by boiling, a yellow dye, which is not very vivid, but lasting, and serves as a basis for turmeric and safflower, which, though more vivid, are not so durable. The berries of *C. cebatha* are eaten in Arabia, but they have an acrid taste; and from them a wine is prepared, which is called by the Arabians *Chamr el Madjume*. The *Colombo Root* of commerce is furnished by *C. palmatus (Jateorhiza palmata)*. It is a native of Mozambique, on the south-eastern coast of Africa, where it grows in great abundance without cultivation, in the thick forests which extend from the sea many miles into the interior. The root is dug up in March, and it is the offsets from the base of the old root that are taken; they are then cut in slices, strung on a cord, and hung up in the shade to dry, which accounts for it always appearing in transverse sections from half an inch to three inches in diameter, and perforated with holes. Colombo is among the most useful of the mild tonics; its action approaches to that of Quassia, being a lively bitter, without astringency or acridity. In large doses it provokes nausea and vomiting; but, judiciously administered, it strengthens the organs without acting as a stimulant, and is particularly applicable in cases of simple dyspepsia. It is much used in Mozambique, in dysentery and other diseases. The true Colombo Root has now become rare in commerce, and its place has been occupied by several substitutes. One is brought from Algeria and the northern parts of Africa; it is detected by being destitute of starch, and by giving a yellow colour to ether. White Bryony, tinged yellow with the tincture of Colombo, has also been fraudulently substituted for the genuine root; and American Colombo, the root of *Frasera Walteri*, is sold in some parts for the genuine. From *Cissampelos Pareira*, the root called *Pareira Brava* by druggists is obtained. It is a bitter-sweet tonic, diuretic and aperient, but is very seldom used in the medicinal practice of the present day. The juice of the tree is used by the native Brazilians against the bite of serpents, as are also the leaves and stem of *C. glaberrima*, which have a stimulating and bitter odour like *Tropæolum*. The root of *Menispermum canadense* is used in Virginia, both in domestic practice and by physicians, as a substitute for Sarsaparilla in serofulous affections. It has a bitter taste, and is said to be a gently stimulating tonic. Of the branches of the *Abuta rufescens* a ptisan is prepared, which is used by the natives of Cayenne against obstruction of the liver, to which they are subject. The same plant is called by them *White Pareira Brava*. There are varieties with red and yellow branches, called *Red* and *Yellow Pareira Brava*.

ORDER VI.—BERBERIDACEÆ—THE BERBERRY FAMILY.

HERBS or shrubs, with alternate, simple or compound, feather-nerved *Leaves*, accompanied with leaflets at their base, which are often permanent and spinous. The *Flowers* are yellow or white, solitary, hermaphrodite, and regular; arranged in simple racemes, rarely in panicles.

Calyx with from three to six segments, which early fall off, is arranged in a double row, and surrounded by petal-like scales on the outside; aestivation imbricate (Fig. 11). *Corolla*, Fig. 24 D, with four, six, or eight petals, which are generally



Fig. 24. *Berberis parviflora*. A—E. Segments of the flower and fruit of the Common Berberry.

equal in number with the segments of the calyx, rarely double that number, arranged in two or three series; usually furnished with two glands or scales at the base on the inside of each, Fig. A. *Stamens* equal in number with the petals, and opposite to them. *Anthers* two-celled, opening from the bottom to the top by a small, somewhat elastic valve, Fig. E. *Ovary* solitary, free, one-celled, containing from two to three ovules, which are erect, attached to the inner wall; numerous, or in pairs; ovary surmounted by a sessile, or bicellular stigma. *Fruit*, a berry, as in *Berberis*, Fig. B, or a

capsule, as in *Epimedium*; one-celled, with one or more seeds. *Seeds* erect, rarely solitary, usually two to three, oval or globose, Fig. B. *Albumen* fleshy, usually rather horny. *Embryo*, Fig. C, straight, slender, with flat seed-leaves, and the radicle more or less thickened at the point; occasionally as long as the axis of the albumen.

GENERA AND SYNONYMES.

Berberis, <i>L.</i>	Nandina, <i>Th.</i>	Caulophyllon, <i>Mx.</i>	Aceranthus, <i>Morr.</i>
Mahonia, <i>Nutt.</i>	Leontice, <i>L.</i>	Diphylleia, <i>Mx.</i>	Vancouveria, <i>Morr.</i>
Odostemon, <i>Raf.</i>	Leontopetalum, <i>T.</i>	Jeffersonia, <i>Bart.</i>	Bongardia, <i>Mey.</i>
Epimedium, <i>L.</i>	Achlys, <i>DC.</i>	Croomia, <i>Torrey.</i>	

GEOGRAPHICAL DISTRIBUTION.—This family is distributed throughout Europe, Asia, and America, generally in the temperate regions; and where they do exist between the tropics, it is generally at high elevations on the mountains. None have hitherto been discovered to exist in Africa, Australia, or the South Sea Islands, but they are found plentifully in the mountainous parts of Northern India, and in some instances in China and Japan: wherever they are found they seem to delight in temperate mountain regions.

PROPERTIES AND USES.—The most common and best known species of the family is *Berberis vulgaris*, the Common Berberry (Fig. 25) of our woods and hedges, the grateful acid of whose fruit has refreshed many a palate. The flowers are offensive to the smell when near, but at a short distance their fragrance is extremely fine. The fruit is of a most agreeable acid flavour, cooling, and good to quench thirst in fevers, and, boiled with sugar, makes an excellent preserve. The berries are also used as a dry sweetmeat in sugar-plums, and the juice to flavour sugar comfits; they are cooling, astringent, and antiscorbutic, and are said to be of great use in bilious affections, diarrhœa, and all cases where heat and acrimony prevail. Though used formerly, and highly spoken of by some old physicians as performing marvellous cures, they are now entirely expelled from modern practice, it having been found that any medicinal uses which existed in the acid of the Berberry were equally met with in other fruits, and hence the Currant is the only one which has been retained in the pharmacopœas. The bark of the root and inner bark of the stem afford a colour which will dye linen or cotton a fine yellow, with the assistance of alum. In Poland they dye leather of a most beautiful yellow colour with the bark of the root, and it is said to be from this root that the fine yellow of morocco leather is obtained. This colouring property is owing to a peculiar crystallizable principle, which has been named *Berberin*; and which is said, in a dose of from one to ten grains, to be tonic and purgative. This principle has been ascertained to possess alkaline properties. The bark of the Berberry, taken as a decoction in ale or white wine, is said to be purgative, and to have proved highly efficacious in the cure of jaundice; hence, in some parts of the country, we have heard the plant called the *Jaundice Berry*. A popular error existed throughout Europe, and does still, to a certain extent, that the Berberry should never be allowed to grow in proximity to Wheat, from the power it has of communicating blight to the plant and rendering the ears abortive. This supposed influence was believed to extend to a distance of 300 or 400 yards across a field, causing that part of the crop to be blighted and barren.

Many experiments have been made by men of high scientific reputation to ascertain the truth of the rumour; by some it has been confirmed, and by others as distinctly denied, and the general belief now is, that it was entirely a popular delusion. The fact is, the Berberry and the Wheat are each subject to the attack of a minute parasitic fungus somewhat similar in appearance but quite distinct. The former is called *Æcidium berberidis*, and the latter *Puccinia graminis*; the Berberry being attacked with its parasitic fungus, and the Wheat exhibiting that which is peculiar to it, in ignorance of the perfect distinctness of the two blights, the coincidence was laid hold of, and attributed to the dispersion of the Berberry fungus upon the wheat plant. The popular delusion therefore, that the Berberry communicates blight to grain crops is entirely without foundation.

A singular circumstance is observable in the stamens of the Berberries, and particularly that of the Common Berberry. They are all bent back to each petal, the concave tips of which shelter the anthers, Fig. 24, D. No agitation whatever of the branch will have any effect on them; but if the inside of the filaments be merely touched with a small bit of stick, a pin, or a needle, they instantly spring from the petals, and shake the pollen against the stigma. This irritability does not exist on the outside of the filaments, nor in the anthers; and if the stamen is bent towards the stigma by the anthers only, no such action is exhibited. From this it is evident that the sudden spring of the stamens is owing to a high degree of irritability in the side of the filament next the ovary, by which, when touched, it contracts, that side becomes shorter than the other, and consequently the filament is bent towards the ovary. This irritability is perceptible in the filaments of flowers of all ages. If the ovary is cut off, the filaments will still contract, and, nothing being in their way, will bend quite over to the opposite side of the flower. After irritation the stamens will return to their original place, and, on being touched again, they will contract with the same facility as at first. What a beautiful example is this of the providence of the All-Wise God! These anthers bent back and sheltered from rain in the concavity of the petals, would probably never reach the stigma, and thereby propagate the species, were it not for this wonderful irritability; there they remain, till some insect coming to extract honey from the base of the flower, thrusts itself between the filaments, and, almost unavoidably, touches them in their most irritable part; the anthers rise and distribute the pollen on the stigma, and thus impregnation of the ovary is accomplished.

B. tinctoria is a native of the Neilgherry mountains of India, where the inhabitants call it *Tiaklou*, and they employ a decoction of the wood and bark, to dye linen and cotton of a bright yellow colour, with the assistance of alum. *B. ilicifolia*, found in the fissures of rocks in Terra del Fuego, is used by the natives to make bows, for which purpose it is well adapted on account of its great elasticity. The wood of *B. lutea* is very hard, and is used in Peru to make domestic utensils and for dying cloth of a yellow colour. An extract of the root, stem, and branches of Indian Berberries are employed with great advantage, it is said, in cases of ophthalmia; and the fruits of *B. asiatica* are dried in the sun like raisins.

The *Mahonias* are very closely related to the Berberries; indeed, some authors include them in one genus. The fruit of *M. aquifolia* make an ex-

cellent preserve, which some have highly praised as good in sore throats; but whether that be the case or not, it is as excellent and palatable a preserve as is made of any fruits in this country; and the fact only requires to be generally known, that all who cultivate this beautiful shrub—and there are few who do not—may be enabled to apply to such domestic use the abundance of beautiful purple berries which this plant annually produces. The preserve is made in the same way as that of black currants, plums, or other fruits which are applied to similar purposes. We are informed by Endlicher that the somewhat bitter leaves of *Epimedium alpinum* were formerly regarded as sudorific. The roots of *Caulophyllum thalictroides* possess the same properties, and the seeds are employed as a substitute for coffee; the plant is esteemed medicinal by the North-American Indians, under the name of *Blue cohosh*. The leaves of *Bongardia chrysona* furnish a grateful acid, and are used in the East as we do sorrel. The tubers of *B. Rauwolfii* are eaten both boiled and roasted in Persia. The tuberculous root of *Leontice leontopetalum*, reduced to powder, is used at Aleppo as a substitute for soap, and the Turks regard it as an antidote to over-doses of opium; it is also used to remove spots and stains from Cashmere shawls and other woollen stuffs of Asia Minor.



Fig. 25. Common Berberry, or Piperidge

ORDER VII.—CABOMBACEA—THE WATER-SHIELDS.

THIS small family is composed of two genera only, *Cabomba* and *Hydropeltis*. They are herbaceous perennials, inhabiting the lakes and rivers of North America, and are a reduced form of Water Lilies. The *Leaves*, which float on the surface of the water, are entire and peltate, that is, having the foot-stalk inserted, not on the margin, as is usually the case, but either at, or towards the centre of the leaf; those immersed in the water are in much-divided segments, fine and thread-like. The *Flowers* are yellow or purple, axillary, solitary, and on long foot-stalks. The *Calyx* is composed of three or four segments, which are coloured on the inside, and the *Petals* are equal in number to the segments of the calyx, and alternating with them. The *Stamens* are definite or indefinite in number, varying from six to thirty-six, and disposed in double or multiple series. *Ovaries* from two to eighteen, terminated by a short style, Fig. B. The *Fruit* consists of from two to eighteen carpels, Fig. A; that is, generally one-half less in number than the stamens; either fleshy or capsular, and unopening; each carpel consists of one cell, containing one to two seeds, which are globose, inverted, or pendulous. The *Albumen* is very large, and rather farinaceous than truly fleshy. *Embryo* small, two-lobed, enclosed in a sac of mucilaginous matter.

Fig. 26. *Cabomba aquatica*.

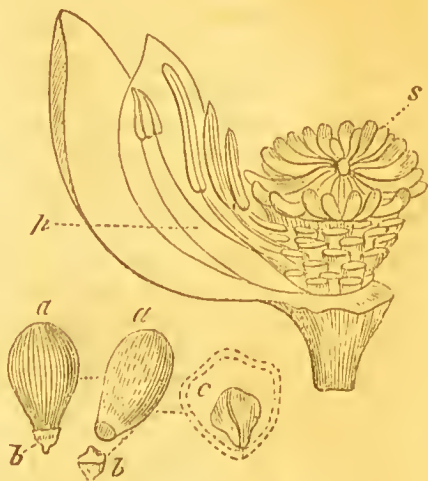
GENERA.

Cabomba, Aubl. | *Hydropeltis*, Mx.

GEOGRAPHICAL DISTRIBUTION.—The plants of this family are all found in America, north of the equator, and extend as far as New Jersey. *Cabomba aquatica* is a native of Cayenne and Guiana, inhabiting ditches and slow running rivulets; also in Georgia and Carolina. *Hydropeltis purpurea* is found in lakes and pools of South Carolina, Tennessee, New Jersey, and Upper Canada; and, according to Gray, it is also met with in New Holland.

ORDER VIII.—NYMPHÆACEÆ—THE WATER LILIES.

THESE are large and beautiful plants, the leaves and flowers of which float on the surface of the water, and the thick, fleshy stem, or rather root-stock, is embedded in the mud. The *Flowers* are large, elegant in form, beautiful in colour, and frequently sweet-scented. The *Leaves* are alternate, entire, heart-shaped, or round, with long foot-stalks inserted at or near the centre. *Calyx* with four or five segments, but generally four, free, rarely adherent; either of a green colour, or more or less coloured. *Petals* numerous, the edges over-lapping each other, arranged in two or more series, one set

Fig. 27. *Nymphaea alba*—White Water Lily.

sometimes passing insensibly into the state of stamens, Fig. 27 *p*. *Stamens* indefinite in number, the exterior ones with the filaments wide and flattened, and assuming the appearance of petals; they are inserted into the receptacle above the petals. The *Anthems* are united to the filaments throughout the whole of their length with two linear cells, which open inwardly. The *Receptacle* is large, fleshy, and more or less surrounds the ovary. *Ovary*, free, and sessile, at the base of the flower, or adhering to the calyx; it is many-seeded and divided internally into many cells, which correspond in number to the lobes of the radiating stigmas on its summit, *s*. The *Fruit* is unopening, fleshy internally, with several many-seeded cells. *Seeds* numerous, attached to the fleshy walls of the cells. *Albumen*, Fig. *a* and *a*, farinaceous. *Embryo*, very small, placed on the outside of the albumen, *b b*, and enclosed in a fleshy sac of mucilaginous matter, *c*.

TRIBE I. *Euryalidæ*.—Tube of the calyx adhering to the ovary. Petals distinct.

GENERA.

Euryale, *Sal.*

|

Victoria, *Lindl.*

TRIBE 2. *Nupharidæ*.—Both the calyx and petals free.

GENERA.

Nymphaea, *Neck.*

|

Nuphar, *Sm.*

TRIBE 3. *Barclayidæ*.—Calyx free. Corolla with the petals united, and adhering to the receptacle.

GENUS.

Barclaya, *Wall.*

GEOGRAPHICAL DISTRIBUTION.—They are met with abundantly throughout the whole of the Northern hemisphere, from Siberia to the tropics. They extend over Europe, through Asia and the islands of the Indian Ocean to North America and towards the south, a few being found in the West India islands, Guiana, and Brazil; some are met with at the Cape of Good Hope and in Madagascar, but they are less common in the south. Their habitats are fresh water rivers, lakes, and pools; and some, like *Nuphar advena*, extend even to the salt water.

PROPERTIES AND USES.—The leaves and stems are bitter and somewhat astringent, and the roots still more so. Some are possessed of reputed medicinal virtues, and from others nutritious alimentary substances have been extracted.

The *Euryalidæ* include that gigantic and noblest of Water Lilies, *Victoria regia*. This regal plant was first discovered in Bolivia by Hænke about the year 1801. It was subsequently found by other travellers, as Bonpland, D'Orbigny, Pöpping, Sir Robert Schomburgk, and Bridges. It was not however till August 1846, that fresh seeds were received in this country. They were collected in Bolivia, and sent by Mr. Thomas Bridges in a bottle containing a small quantity of moist earth, and were sown in the Botanic Garden at Kew. Only two of them germinated, and in the December following both died. In October, 1848, roots collected by Indians employed for the purpose, were forwarded to Kew in a glass case by Dr. Broughton, of Leguan Island, but on arrival they were discovered to be dead. The same gentleman sent in the following month dried capsules containing the seeds, and subsequently other seeds in a bottle of muddy water, but none of them germinated. The honour of the successful introduction of this remarkable plant to Europe is due to Dr. Rodie and Mr. Luckie, of George Town, Demerara, who forwarded to Kew seeds in small phials filled with pure water. The first arrival was on the 28th of February, 1849, and they were found to be quite perfect. By the 23rd of March six of the seeds germinated with a healthy growth, and by the end of the summer upwards of fifty plants were raised. These were distributed among the principal plant establishments, but the only instances in which success attended the cultivation were at Chatsworth, under Mr. Paxton, and at Syon House, under the care of Mr. Ivison. The first flowers were produced at Chatsworth. The plant was one of those raised at Kew in March 1849. It was received

at Chatsworth in August, and planted out in a tank on the 10th of August. The first flower-bud appeared on the 1st of November, partially opened on



Fig. 28. Victoria Regia.

the 8th, and on the 9th it was fully expanded. Our figure represents the

flower as it appeared on the morning of the second day after it opened. This "vegetable wonder," with its leaves five or six feet in diameter, and its colossal flowers of "many-hundred petals," is now familiar to the greater mass of persons, and we do not therefore consider it necessary to enlarge our description of it.

The fruit of *Victoria regia*, when ripe, is said to be half the size of a man's head, full of round farinaceous seeds, which are washed and eaten, forming a valuable article of food; it is on this account called *Mais del Agua*, or Water Maize. In Guiana it is called *Irupé* or *Yrupé*, signifying Water-platter, from its broad leaves. Pöpping says it is called *Murura*, while according to Bridges the natives of Santa Anna call it *Morinqua*, and the Cayababas call it *Dachochó*. The flowers are peculiarly fragrant. Mr. Bridges says that they exhale a delightful odour which he compared at first to a rich pine-apple, afterwards to a melon, and then to the cherimoyer, and still so distinct from each, that he came to the conclusion that it was peculiar only to this plant.

The Nupharidæ embrace the greatest number of the Water Lilies, and are distributed throughout the whole of the Northern hemisphere. *Nuphar lutea*, Fig. 29, or Common Water Lily of our ponds, lakes, and still rivers, is found all over Europe and Siberia. The flowers smell like brandy, and are hence called in some parts of England, *Brandy bottles*. They are said to possess a narcotic and sedative virtue, and from them the Turks prepare a cooling drink called *Pufer ciceghi*. The thick fleshy root-stocks of this and *Nymphaea alba*, or White Water Lily, Fig. 27, are composed almost entirely of starch, and mucilage, combined with a slightly acrid and narcotic principle. They contain, also, tannin in sufficient quantity to render them serviceable in dying black; an uncrystallisable sugar; resin; a nitrogenous matter, and different salts. When repeatedly washed, and deprived of their acrid and narcotic properties, they become innoxious, and serviceable as an article of food, those of *N. alba* having been so used by the ancient Egyptians, as they still are by the Swedes, as a substitute for corn. The root-stocks of the latter are also used in Ireland and in the Hebrides for dying a brown colour, and the stems are better than oak-galls for dying grey. Linnæus says, the flowers of this species raise themselves out of the water, and expand about seven o'clock in the morning, and close again, reposing on the surface of the water, about four o'clock in the afternoon. The root-stocks of *N. lutea* are eaten by swine, but are disagreeable to goats, and horses and kine entirely reject them. When burned in rooms, the smoke drives away crickets, and they and cockroaches are destroyed by the roots rubbed or bruised with milk. *Nymphaea odorata*, the Sweet-scented Water Lily of the United States, is distinguished by the beauty and delicious fragrance of its large white and many-petaled flowers. Its roots are extremely bitter and astringent, and contain much tannin and gallic acid; they are used by the common people in the composition of poultices, which answer somewhat the same purpose as lead poultices and alum curds. Their decoction instantly strikes a jet black colour with sulphate of iron, and yields a dense white precipitate to a solution of gelatine. The celebrated *Lotus*, which the ancient Egyptians held sacred to Isis, is *N. lotus*, and was sometimes engraved on their coins; but it is not the same as the equally venerated plant of the same name among the Hindoos, although

they also regard some of these as sacred; such are *N. rubra* and *N. pubescens*. We are informed by Herodotus that, in his time, when the Nile was full, a vast quantity of the Lotus grew in the water, and, when gathered, dried in the sun till the seed was parched; of this they made bread, which they baked over a fire. The root, he says, is eatable and sweet. In the heathen mythology it was with the Lotus, the Crocus, and the Hyacinth, that the couch of Jupiter and Juno was formed. Dr. Shaw says the Lotus is the favourite vegetable symbol of the old Egyptians; "it attends the motions of the sun, lies under water in his absence, and has its flowers, leaves, and root of the same round figure as that luminary." It is called by the Arabians *Noufar*, and its roots form one of the most common articles of food of the Egyptians. After the inundations of the Nile, when the waters have retired, the roots are gathered, and then dried and preserved to be eaten boiled, as we do potatoes, which they very much resemble in flavour, and, though not so firm, are more farinaceous, so much so that there is a difficulty in swallowing more than one without being obliged to drink. *N. cærulea* was also held sacred by the ancient Egyptians, and may still be found sculptured on their old monuments and hieroglyphics.

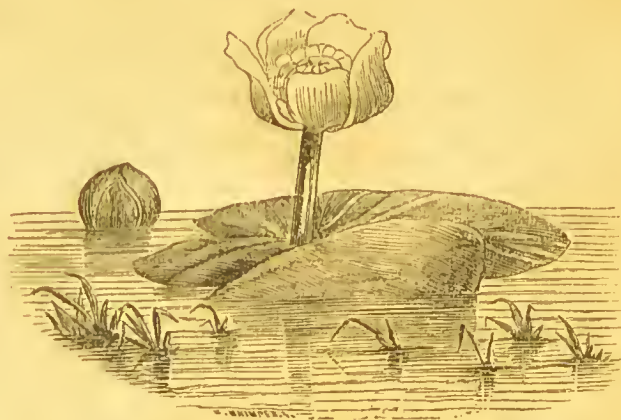


Fig. 29. *Nuphar lutea*—Yellow Water Lily.

ORDER IX.—NELUMBIACEÆ—THE WATER-BEANS.

THIS is another small family formed of one genus, and formerly belonging to the Water Lilies, from which it differs in the total want of albumen, and the peculiar large fleshy receptacle. The habit and habitat of the plants are also the same as in the Water Lilies, growing in still waters, the peltate leaves floating on the surface, and the *Flowers* presenting the same general structure as those of that family. The female sexual organs are composed of a considerable number of *Carpels* embedded in the plane of a depressed sub-conoid receptacle; the superior extremity of the style and stigma being alone visible on the surface, Fig. 30. Each carpel is composed of a single *Ovary*, completely sunk in the substance of the receptacle; one-celled, and containing an *ovule* which is suspended from the point of a cord rising from the base of the cavity. The *Style* is excessively short, terminated by a simple stigma depressed at its centre. The *Fruit* consists of seeds the size of acorns, half-buried in the hollows of the receptacle. *Seeds* solitary, rarely two. *Albumen* wanting. *Embryo* large, with two very thick obtuse seed-leaves (cotyledons) and a well-developed plumule, enclosed in a thin membrane in the form of a sort of sac, Fig. 27, c.

Fig. 30. Fruit of *Nelumbium speciosum*.

GENUS AND SYNONYMES.

Nelumbium, Juss.
Nelumbo, Gertn.
Cyanus, Sal.

GEOGRAPHICAL DISTRIBUTION.—The species of this family are found in India, China, and the islands of the Indian Archipelago; rarely in Egypt and on the shores of the Caspian Sea, but plentifully in the United States.

PROPERTIES AND USES.—They are all esteemed for the beauty of their flowers, but the most remarkable species is *Nelumbium speciosum*, the *Egyptian Bean* of Pythagoras, the *Lotus* and *Tamara* of the Hindoos, and the *Lien-Hoa* of the Chinese. By the ancients it was regarded as the emblem of fertility, and with it the Egyptians decorated the heads of their idols Isis and Osiris. It is held sacred by the Hindoos, and serves for the floating shell of Vishnu and the seat of Brahma. Sir W. Jones says: "The Thibetians are said to embellish their temples and altars with it; and a native of Nepal made prostration before it, on entering my study, where the fine plant and beautiful flowers lay for examination." Dr. Wight states that the leaves and flower-stalks abound in spiral vessels, which they extract and form into those wicks which, on great and solemn occasions, are burnt in the lamps of the Hindoos, placed before the shrines of their gods. The Chinese extol it for its virtues, and rank it among those plants which are employed in the composition of the "Liquor of Immortality." They eat the seeds as we do filberts, but they are more difficult of digestion;

and are preserved in different ways with sugar. The root of the plant they also admit to their tables; great quantities being pickled with salt and vinegar, and reserved to eat with rice; and when reduced to powder it makes excellent soup with water and milk. It is from this root that *Chinese Arrow-root* is said to be obtained. The leaves are much used for wrapping up fruits, fish, salt provisions, &c.; and, when dry, the Chinese mix them with their smoking tobacco to render it softer and milder. The Japanese, Thunberg states, regard the plant as pleasing to the gods, the images of their idols being often represented sitting on its large leaves. Some of the heathen have pictures thus drawn, which they make use of to animate the minds of the pious upon their death-beds, and to raise their affections heavenward! A viscid milky juice is found in the leaf-stalks and flower-stalks, which, according to Endlicher, is employed as a remedy against sickness and diarrhœa. The petals smell like the flowers of Anise, and are slightly astringent, being used as the flowers of Roses.

The roots of *N. luteum* are farinaceous, and agreeable when boiled, resembling in flavour those of the sweet potatoe (*Batalas*); the seeds are also eagerly sought after by children and the Indians of North America.



ORDER X.—SARRACENIACEÆ—THE SIDE-SADDLE FLOWERS.

THE plants composing this family are herbaceous perennials, inhabiting the swamps of America. The *Leaves* are radical, with the footstalk so spread out and disposed, as to assume the form of a horn with a lid at the top, and often marked with red or yellow spots on a white ground. The *Flowers* are regular, and hermaphrodite. *Calyx* with four to five segments, encompassed with three small leaves on the outside. *Corolla* with four to five concave petals, inserted on the receptacle, but sometimes wanting. *Stamens* indefinite in number, closely packed together, and inserted in the receptacle. *Anthers* oblong, inserted by their back, opening upwards from their base. *Ovary*, Fig. 31 *a*, free, with three to five cells. *Style*, *d*, simple, very short, terminated by a broad, convex, leafy five-angled stigma, *c*, like a parasol.

Fruit a seed-vessel (capsule) with three

three to five many-seeded cells. *Seed*, *b*, small, slightly warted. *Embryo* cylindrical, cleft at one extremity into two seed-leaves, placed at the base of a copious waxy, granular albumen.

Fig. 31. *Sarracenia purpurea*.

GENERA.

Sarracenia, L.*Heliamphora*, Benth.

GEOGRAPHICAL DISTRIBUTION.—*S. purpurea* extends from Canada over the whole of the United States, but the other species are confined to the south. *Heliamphora* was discovered by Schomburgk growing in Guiana.

The plants of this family are remarkable chiefly for the singular conformation of their leaves and stigmas, the former forming a horn-shaped pitcher which holds water, to which birds resort in times of drought to quench their thirst; the latter have been compared by some to a parasol, and by others to a cushion or pad, resembling the pillion on which our grandmothers sat in the "good old times" when they took their horse-back journies; hence this family has been called the *Side-saddle Flowers*, and not, as Dr. Lindley says, "in allusion to the singular tubular leaves."

ORDER XI.—PAPAVERACEÆ—THE POPPY FAMILY.

ANNUAL, perennial, and a few half-shrubby plants compose this order.

They contain a milky, narcotic, or acrid juice, which is white in the Poppy, yellow in Celandine, and red in the Blood-root. *Leaves* alternate, more or less deeply divided, with or without footstalks, usually widened at their base, and half-clasping the stem. *Flowers* hermaphrodite, regular, or rarely irregular. *Calyx* with two, very rarely three, concave segments, which very early fall off. *Corolla* with four or five petals, much crumpled up before they expand. *Stamens* indefinite in number, distinct, disposed

in one or many series, and inserted in the receptacle.

Anthers, 2-celled, inserted by their base, and opening by two furrows.

Ovary, 1-celled, dis-

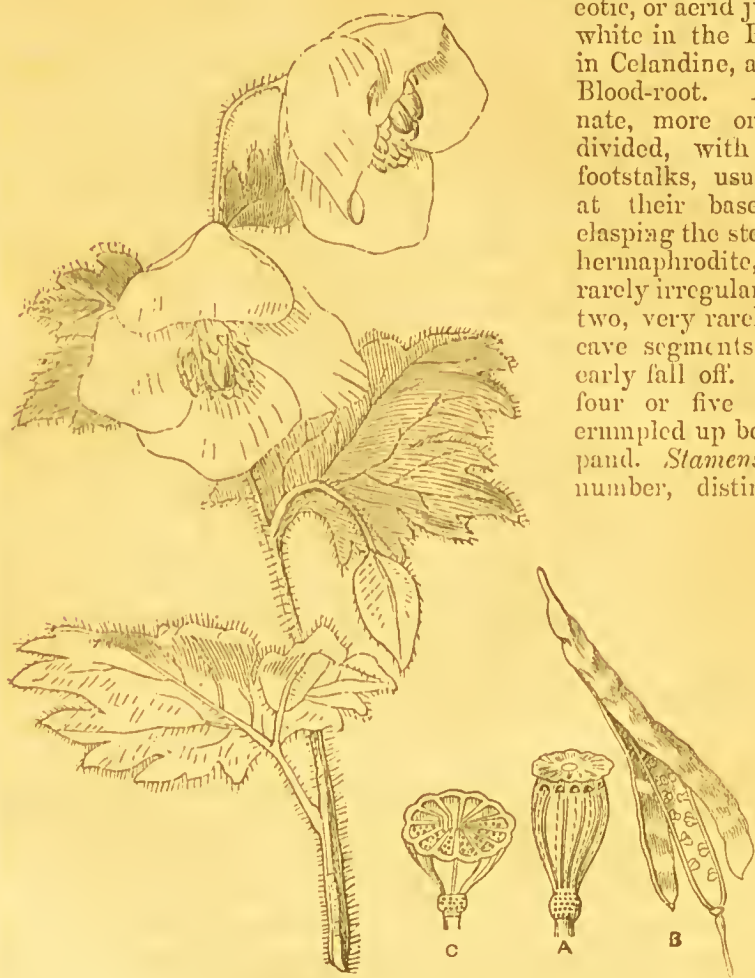


Fig. 32. *Cathcartia villosa*. A, Capsule of the Poppy; C, section of ditto. B, Seed-vessel of the Celandine.

tinet, often with several incomplete partitions, to which numerous ovules are attached, C. *Style* very short, or wanting, terminated by two or more *Stigmas*, which are united, forming on the summit of the ovary or the fruit a sort of cap marked with star-like bands. *Fruit* dry, many-seeded; a capsule opening by pores under the stigma, Fig. 32 A, as in the Poppy, or elongated into a sort of pod and opening by two membranous valves, as in the Celandine, B. *Seeds* usually very small and numerous, without an aril, except in *ecconia*. *Embryo* small, placed in the base of a fleshy, oily albumen.

TRIBE 1. *Papavereæ*.—Juice milky, often coloured.

GENERA AND SYNONYMES.

<i>Bocconia</i> , <i>Pl.</i>	<i>Stylophorum</i> , <i>Nutt.</i>	„ <i>Calomecon</i> , <i>Spac.</i>	„ <i>Argemonidium</i> , <i>S.</i>
<i>Macleaya</i> , <i>R. Br.</i>	<i>Argemone</i> , <i>T.</i>	<i>Meconium</i> , <i>Spac.</i>	<i>Closterandra</i> , <i>Belan.</i>
<i>Sanguinaria</i> , <i>L.</i>	<i>Meconopsis</i> , <i>Vig.</i>	<i>Meconidium</i> , <i>S.</i>	<i>Cathcartia</i> , <i>Hook.</i>
<i>Chelidonium</i> , <i>T.</i>	<i>Cerastitis</i> , <i>Gray.</i>	<i>Meconella</i> , <i>S.</i>	<i>Rœmeria</i> , <i>Medik.</i>
<i>Echthrus</i> , <i>Lour.</i>	<i>Papaver</i> , <i>T.</i>	<i>Rhœadum</i> , <i>S.</i>	<i>Glaucium</i> , <i>T.</i>

TRIBE 2. *Hunnemannieæ*.—Juice watery; seed-vessels two-valved, and the seeds attached to the margins of the valves.

GENERA AND SYNONYMES.

<i>Eschscholtzia</i> , <i>Cham.</i>	<i>Hunnemannia</i> , <i>Sw.</i>	<i>Dendromecon</i> , <i>Benth.</i>
<i>Chryseis</i> , <i>Lindl.</i>		

TRIBE 3.—*Platystemoneæ*.—Juice watery; seed-vessels three-valved, seeds attached to the margin of the valves; or, capsules numerous, free, and parting into one-seeded articulations.

GENERA AND SYNONYMES.

<i>Platystigma</i> , <i>Benth.</i>	<i>Platystemon</i> , <i>Bent.</i>	<i>Romneya</i> , <i>Harv.</i>	<i>Arctomecon</i> , <i>Torr.</i>
<i>Meconella</i> , <i>Nutt.</i>	<i>Boothia</i> , <i>Dougl.</i>		

GEOGRAPHICAL DISTRIBUTION.—The greatest number is found in the temperate regions of the northern hemisphere, and particularly in Europe; few in Asia, and between the tropics; one only is met with at the Cape of Good Hope, and one in Australia; but more frequently in North America.

PROPERTIES AND USES.—The white or yellow milky juice contained in different parts of the plants of this family, which is more or less acrid, betrays suspicious and deleterious properties. Thus, in the Poppies, it is essentially narcotic; in the Celandine it is very caustic; and in the Blood-root it is emetic and caustic. These qualities, however, do not exist in the seeds, which are remarkable for the fat oils which they furnish.

Papavereæ.—It is in this tribe that we find the active properties of the family most prominent.

Bocconia pubescens contains a yellow acrid juice, which is detergent and escharotic. The root is applied to ulcers and wounds, when their healing is retarded by the growth of fungous flesh; and its stimulant qualities promote a healthy granulation of the part, and soon complete a cure. It is called in the West Indies *Parrot-weed*, or *Tree Celandine*, and, according to Hernandez, was cultivated in their gardens by the ancient monarchs of America. *Sanguinaria canadensis*, called *Blood-root*, or *Puceoon*, contains an orange-coloured sap, which flows from every part of the plant when wounded, but is of the deepest colour in the root. The whole plant is an active narcotic, but it is only the root which has been employed officinally. This, when dried, has a faint narcotic odour, and a bitterish and very acrid taste, the pungency of which remains long in the mouth and fauces. It is an acrid emetic, with stimulant and narcotic powers. In small doses, it excites the stomach, and accelerates the circulation; when given more largely, it produces nausea, and consequent depression of the pulse; and in a full dose, occasions active vomiting. Snuffed up the nostrils, it excites much irritation, attended with sneezing; and upon fungous flesh it acts as an escharotic. A peculiar alkaline principle was obtained from Blood-root,

called *Sanguinarina*, which is supposed to be the active principle of the plant. It is a white, pearly substance, of an acrid taste, very sparingly soluble in water, soluble in ether, and very soluble in alcohol. With the acids, it forms salts soluble in water, all of which have some shade of red, crimson, or scarlet, and form beautiful red solutions.

Chelidonium majus, or *Great Celandine*, emits a yellow juice, which is bitter, and exceedingly acrid, and, when applied to the skin, causes inflammation and even blisters; it has been known, when applied to the naked cellular tissue, to cause death, by the violence of the inflammation which it occasioned; and it has therefore been classed by M. Orfila among the irritant poisons. Celandine is an active and drastic purgative, possessed, also, of diuretic, and perhaps diaphoretic and expectorant properties; it is said to be of advantage in serofulous diseases, and those affecting the mesenteric and lymphatic glands, the skin, and the eyes; to the latter, the juice has been applied in drops, to remove spots on the cornea; but it is, at least, a dangerous application, and should never be resorted to, except under the administration of a competent operator. The same warning need not, however, be considered, in its application to corns and warts, which it destroys, by stimulating them beyond their vital powers. From the analysis of Chevalier and Lassaigne, Celandine affords a bitter, resinous substance, of a deep yellow colour; a kind of gum resin, of an orange-yellow colour, and bitter, nauseous taste; mucilage, albumen, and various saline substances; besides free malic acid and silica. There has also been found in it a peculiar acid, called *Chelidonic acid*; and two alkaline principles, one of which forms neutral salts with the acids, and is called *Chelerythrin*; and the other, which unites with, but does not neutralise the acids, is named *Chelidonia*. The plant is called, also, *Swallow-wort*—"not," as old Gerard says, "because it first springeth at the coming-in of the swallows, or dieth when they go away—for it may be found all the year; but because some hold opinion, that with this herb the dains restore sight to their young ones when their eyes be out; which things are vain and false."

Argemone mexicana possesses the same properties as the rest of the family. It is a native of Mexico, and is called by the Spaniards *Fico del Inferno*, or *Devil's Fig*. In the West Indies it is called the *Yellow Thistle*, and by the Brazilians *Cardo santo*; and they administer the juice to persons or animals bitten by serpents. The whole plant abounds in a milky, viscid juice, which becomes yellow on exposure to the air, and assumes the consistence of gamboge; it is acrid, and has been used internally in obstinate cutaneous eruptions, and as a local application to wasting malignant ulcers, and diseases of the eye. The flowers are stated by De Candolle to have been employed as a soporific; but it is the seeds which are most esteemed. From them an oil is expressed which is used in Mexico for shining wood, and which possesses cathartic properties; they are narcotic, especially if smoked with tobacco; and two drachms, infused in a pint of water, act as an emetic.

Papaver somniferum, or *Common Poppy*, Fig. 32, is not only the type, but the most important plant in this family; or, perhaps, as regards its products, the most important plant in the *Materia Medica*. It is found in a wild state throughout the whole of Europe, in Egypt, and in Asia; and although frequently met with apparently wild in Britain, it is generally

believed to have been introduced at some early period. The whole plant possesses an acrid, resinous, and bitter flavour, and emits a nauseous smell. In all its parts it contains a white, opaque, narcotic juice; but it is in the capsule or seed-vessel that the juice most abounds, and the virtues of the plant chiefly reside. This juice, which exudes after incision, becomes dry and hard, and is then known by the name of *Opium*. The Poppy is cultivated very extensively in the Asiatic provinces of Turkey, Egypt, Persia, and India. The plants, during their growth, are carefully watered and manured—the watering being more liberal as the period of flowering approaches, and until the capsules are half grown, when it is discontinued, and the gathering of the opium commences. The manner in which opium is obtained is still the same as that practised in the East, centuries before the time of our Saviour. A few days after the fall of the flower, men and women proceed to the fields at sunset, and make horizontal incisions in the poppy-heads or capsules, taking care not to cut so deep as to penetrate their cavity. A white juice exudes, and appears in the form of tears, on the edges of the incisions; and the night dews favour the exudation of the juice. The field is left in this state for twenty-four hours, after which the juice is scraped off with a small iron scoop, or blunt knives. A portion of the skin of the capsule is also removed, and



Fig. 32.

constitutes about one-twelfth of the whole product. This operation is never performed more than once on each head. After it is gathered, the opium is put into small earthen vessels, and moistened with saliva; then worked with a wooden spatule, in the sun, till it attains a proper consistency. It is then formed into cakes, and wrapped in leaves of Tobacco or Poppy, and sent into the market.

Although it requires a much warmer climate than ours to grow opium profitably, still the attempt has not altogether failed in this country; but, on the contrary, has met with a large measure of success. In 1796, a premium was awarded by the Society of Arts, in London, to a Mr. Ball, for a specimen of British opium; and in the 18th volume of the Transactions of the same society, there is a paper, by a Mr. Jones, on the method of collecting it. In 1802, five drachms of pure opium were obtained from 600 heads of the Poppy. But the most interesting and detailed account of the successful cultivation of the Poppy, and the production of opium, is that given by Dr. Howison, of Crossburn, Lanarkshire, for which he received the Prize Medal of the Caledonian Horticultural Society, in 1813. The cake of opium from which the specimen sent was taken, weighed eight ounces and a half, and was collected by a young lady, from a field of poppies measuring about eleven rods, in the course of a fortnight; the bleeding and gathering being

wholly done by herself at leisure hours. Upon the qualities of this opium, the celebrated Dr. Duncan reported, that during his attendance in the wards of the Royal Infirmary, he had many opportunities of exhibiting it; that it had proved, in its power of inducing sleep, of alleviating pain, and in cases of diarrhoea, in no degree inferior to the best Turkey opium. The most successful attempt at the production of opium in this country was that of Mr. John Young, a surgeon in Edinburgh, who, from one acre of poppies, obtained fifty-six pounds of opium, which he sold at thirty-six shillings a pound.

The countries in which opium is produced as an article of commerce are, Asiatic Turkey, Egypt, Persia, and India. The *Turkey Opium* is exported from Smyrna and Constantinople, and is the produce of the province of Anatolia. It is always distinguished by being covered externally with the remains of leaves, and by a quantity of the seed vessels of a species of *Rumex*, which are employed to prevent the lumps from adhering and forming a mass. It is in masses, which have been originally of a round form, but variously indented, and rendered quite irregular, by the pressure to which it has been subsequently subjected. Two varieties are distinguishable in the Turkey Opium. In that which comes from Smyrna, when a lump is broken, numerous minute shining tears are observable, particularly under the microscope, bearing some resemblance to small seeds, but readily distinguishable by pressure between the fingers. These are supposed to be drops of the juice which escape from the incisions of the capsules, and which, according to Belon, are allowed to congregate before they are removed. The same author states, that after the juice has been collected, it is not subjected to the process of kneading or beating, as in the case of other varieties of opium. Another peculiarity of this variety is, the minute pieces of the poppy capsules which are found intermingled in the mass, which may arise from the mode of collecting it; but these are the only impurities which it contains. Smyrna opium should yield from ten to eleven per cent. of morphia. That which is received from Constantinople is wholly destitute of the tears of which we have just spoken; and in this alone does it differ, in external appearance, from the former variety, as it also has the seed-vessels of the *Rumex* attached to it. *Egyptian Opium* is in the form of flat, roundish cakes, sometimes as much as six inches in diameter, and weighing a pound, and sometimes weighing not more than half an ounce. These cakes are wrapped in a Poppy-leaf, so placed that the midrib divides the surface in two equal halves; and, should the leaf be not present, the mark of the midrib may still be detected. This variety is wholly destitute of the seed-vessels of the *Rumex*, and differs from the preceding in being brittle instead of tenacious, and equally hard in the centre as at the surface. Egyptian opium presents all the indications of extensive adulteration. On exposure to the air it becomes damp and sticky, indicating the presence of some deliquescent substance; and, on analysis, it is found to contain only six or seven per cent. of morphia. *Indian Opium* is of two kinds: that produced in Bahar and Benares being called *Bengal Patna Opium*, and that of the interior provinces *Malwa Opium*. The former is in the shape of round balls, weighing three pounds and a half, and enveloped with a coat, half an inch thick, of poppy leaves and petals. It is either a very inferior variety to Turkey opium, or is very extensively adulterated, as the greatest amount of

morphia which has hitherto been extracted from it does not exceed five per cent. The belief is, that its inferiority arises from the mode of preparation: the juice being kept some time after collection, fermentation ensues before it is made. But there is a variety made in Bahar, and designated *Garden Patna Opium*, which, Dr. Christison says, is little inferior to Turkey opium, in the proportion of morphia which it contains, arising from the juice not having undergone fermentation. It is in the form of cakes, three or four inches square, and about half an inch thick, which are packed in cases with a layer of mica between them. These cakes are without any wrapper, hard, dry, and brittle, and of an uniform shining fracture. The colour is sometimes almost black, and sometimes of a light brown. *Malwa Opium* is made in the form of flat, roundish cakes, five or six inches in diameter, and from four to eight ounces in weight. They are quite hard, dry, and brittle, of a light brown colour, shining fracture, and quite free from impurities. This is much superior to the common Bengal opium, and yields nine-and-a-quarter per cent. of morphia. *Persian Opium*.—It is very rarely that this appears in the markets of this country. It is presented in the form of cylindrical pieces, three inches and a half long, and half an inch thick, wrapped in glossy paper, and tied with a cotton thread. Under the microscope, it exhibits the agglutinated tears met with in Smyrna opium, but very much smaller in size. The quality is of a very inferior description, and, on analysis, does not contain more than three per cent. of morphia.

Opium is one of the most valuable medicines of the pharmacopœa. It is a stimulant narcotic, exercises an absolute control over the nervous system, but its operation is one of the most complicated and obscure in the science of medicine. A small dose, such as half a grain or a grain, calms excitement, allays pain, and often procures refreshing slumber. A larger dose produces, in some cases, more or less of profound stupor, succeeded by debility and fears; in others, it is exciting, exalts all the functions, and causes a sort of delirium or mental alienation; and, lastly, it occasions death. The natives of India and the East use opium in large quantities without inconvenience, particularly the Mahommedans and Hindoos, who find in it the most pleasing substitute for those alcoholic drinks which their religion prohibits. The Turks and Persians eat it almost constantly, and mix it with their sherbets and other beverages; and by many nations of the East it is smoked, as those of the West do tobacco. In the year 1852, the opium imported into this country amounted to the enormous quantity of fifty-one tons.

According to the best authorities, the chemical constituents of opium are, morphia, narcotin, codeia, paramorphia, narcein, meconin, porphyroxin, pseudomorphia, meconic and sulphuric acids, a peculiar acid not yet sufficiently investigated; extractive matter, gum, bassorin; a peculiar resinous body, insoluble in ether, and containing nitrogen; fixed oil; a substance resembling caoutchouc; an odorous volatile principle; besides lignin, and a small proportion of acetic acid; sulphate of lime, sulphate of potassa, alumina, and iron. By far the most important of these ingredients is *Morphia*. It is the chief, if not the exclusive narcotic principle of opium, and is a salt crystallised in the form of irregular, six-sided prisms; colourless, bitter, inodorous, and nearly insipid. When exposed to heat, it becomes white and opaque; at a higher temperature, it melts

to a yellowish liquid, and crystallises again when cooled; and when heated in the open air, it burns with a bright flame. It is nearly insoluble in water, but quite soluble in oil or boiling alcohol. It is the salts of morphia, the acetate, sulphate, and muriate, that are used in medical practice. They have the anodyne, soporific, and diaphoretic properties of opium, but are less stimulant, less disposed to constipate the bowels, and less apt to leave behind them headache, nausea, or other unpleasant effects. *Narcotin*, or *Narcotina*, as it is called by those who regard it as an alkali, is a white, tasteless, and inodorous salt, in the form of flexible, needle-shaped crystals, larger than those of morphia. It is insoluble in cold, but soluble in boiling water and boiling alcohol, the fixed and volatile oils, and the diluted acids. Though tasteless, its salts are bitter, even more so than those of morphia. Contrary opinions have been expressed with regard to the active properties of narcotin. Magendie found one grain, dissolved in oil, threw a dog into a state of stupor, which, in twenty-four hours, terminated in death; but that the unpleasant effects were modified or prevented in conjunction with acetic acid, twenty-four grains being given to a dog, dissolved in vinegar, without causing death. M. Baily prescribed it in the dose of sixty grains, both in the solid state, and dissolved in muriatic acid, without observing from it any sensible effect; and in the same state, Orfila found that it might be taken by man, in very large doses, with impunity; but, upon dogs, a solution of thirty or forty grains, in acetic or sulphuric acid, or olive oil, were sufficient to produce fatal effects. It is believed that narcotin, either in the solid form, or dissolved in acids, is not possessed of any considerable narcotic powers, but that any effects of a narcotic character which have been attributed to it have arisen from the use of a preparation not entirely freed from other principles contained in opium. *Codeia* is in the form of flat, colourless, transparent prisms. It is soluble in water, and when added in excess to boiling water, the undissolved portion melts, and sinks to the bottom, having the appearance of an oil. It is soluble, also, in alcohol and ether, but is insoluble in alkaline solutions. The medicinal effects of a dose of three grains produces no result; but in a quantity of four or six grains, it accelerates the pulse, occasions a sense of heat in the head and face, and gives rise to an agreeable excitement of the spirits, like that produced by intoxicating drinks, which is attended by a sense of itching on the skin, and, after lasting several hours, is followed by an unpleasant depression, with nausea, and sometimes vomiting. *Paramorphia* is white, in the form of needle-shaped crystals, of an acrid and styptic, rather than a bitter taste. It is scarcely soluble in water, very soluble in alcohol and ether, even when cold, and still more so when heated, and capable of combining with the acids, with which it does not form crystallisable salts. Magendie states that its effect on the system closely resembles that of brucia and strychnine, producing tetanic spasms, in doses of one grain. *Narcein* is white, in silky, needle-shaped crystals, inodorous, slightly bitter, and pungent. It is soluble in water and alcohol, but insoluble in ether, and has not been found, as yet, to have any influence on the system. *Meconin* is also white, and in the form of needle-shaped crystals; it is soluble in water, ether, alcohol, and in the essential oils. From the degree of acrimony which it presents, it may be supposed to have some influence on the animal system, but its effects have not been sufficiently observed. *Meconic acid* is in white crystalline scales, of a sour taste, fol-

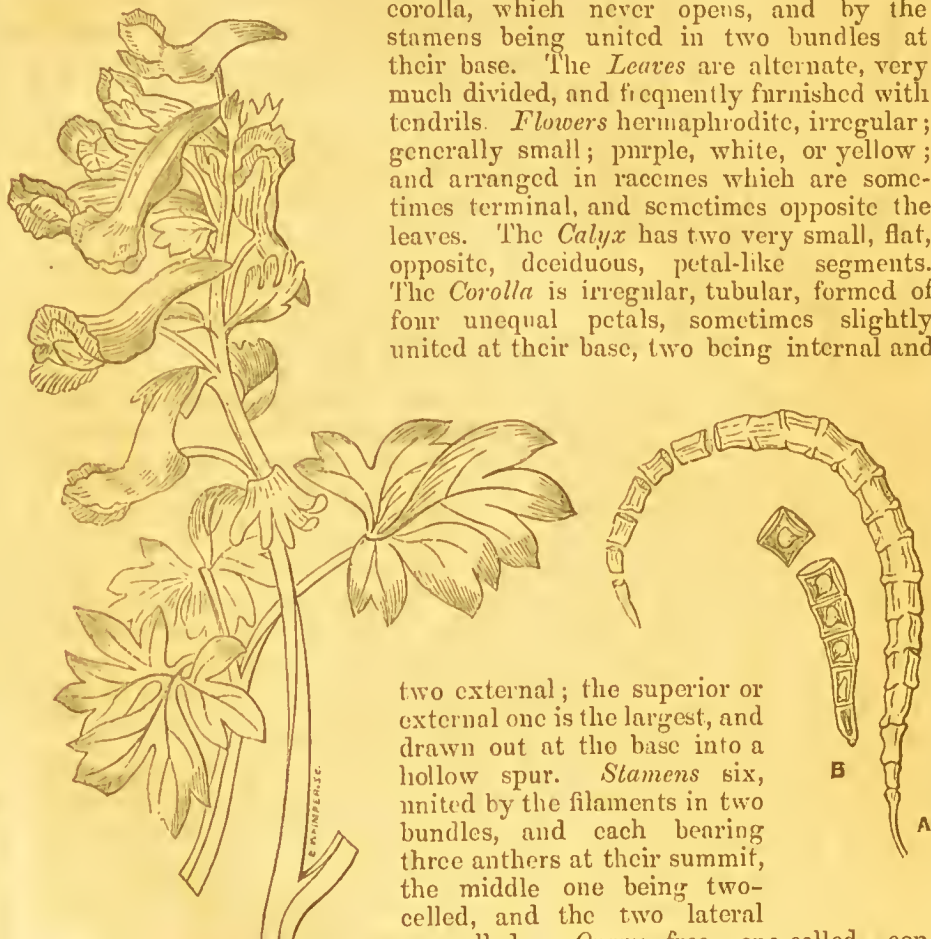
lowed by bitterness. It exerts no influence on the animal system, and is not used separately in medicine.

Poppy-heads are the dried seed-vessels or capsules of the plant, and are used in medicine as an external emollient, and anodyne application; in the form of emulsion, syrup, or extract, they are often used internally to calm irritation, promote rest, and produce the narcotic effects of opium. *Poppy seeds* do not possess any of the narcotic or acrid properties of the plant, but, on the contrary, consist of a simple farinaceous matter, abounding in a bland oil, which is obtained by expression. In some parts of Europe and the East, they are employed as an article of food, being baked in cakes, or strewed upon bread and butter. The ancients rolled them up in their bread, to excite an appetite. Virgil calls it *cereale papaver*, either from the seeds being eaten as food, or from it being sown among the corn as an offering to Ceres, to whom the plant was dedicated, and who is always represented crowned with Poppies. Tournefort observes that Poppy seeds encrusted with sugar, after the manner of comfits, are extensively consumed by all classes of the Genoese. They are eaten by the Egyptians and Persians; and Gilibert informs us that they are made into puddings by the inhabitants of Lithuania, and they may be employed in emulsions for the same purposes as sweet almonds. Poppy-seed is consumed to a considerable extent under the name of *Maw-seed*, being given to singing-birds as a cooling food when they are moulting. *Poppy oil* is sweet, almost inodorous, of an agreeable taste, and very wholesome. It is not only frequently mixed with, but is used as a substitute for olive oil, and is applied to many domestic purposes instead of butter, and to the finer kinds of oil painting. It burns and smokes badly, is drying, saponaceous, and does not solidify nor become rancid. The cake or residue, after the oil is expressed, forms a nutritious food for cattle, like the linseed oil-cake. In 1700, when the olive-crop failed, the poppy oil furnished a ready and acceptable substitute.

Papaver rhæas, or Corn Poppy, so common in the corn-fields of England, and no small source of annoyance to the farmer, has its uses also. The heads contain the same milky juice as the common Poppy, and opium has been extracted from them, but in so small a quantity that the return does not remunerate for the labour. The petals, which have a narcotic smell, are mucilaginous and slightly bitter, are employed officinally, more for the beautiful scarlet colour which they communicate to water, than for any medicinal virtues which they may possess. A syrup is prepared from them, which was formerly prescribed in catarrhal affections, but is now valued only for its colouring properties. The colouring principle of the flowers are two acids, which are termed *Rhæadic* and *Papaveric acids*. Theocritus tells us that the Greeks had a custom of taking a petal of the Corn Poppy and laying it on the thumb and forefinger of one hand, and slapping it with the other. If it gave a crack, it was a sign their lovers loved them; but if it failed, they lamented their disappointment. In the third Idyllium, the goatherd tells Amaryllis that he had lately tried whether she loved him, but the "telephion" gave no crack.

ORDER XII.—FUMARIACEÆ—THE FUMITORIES.

ANNUAL or perennial herbaceous plants, containing a watery juice, and differing from the Poppy family, to which they are closely allied, by the absence of the milky juice, the irregular corolla, which never opens, and by the stamens being united in two bundles at their base. The *Leaves* are alternate, very much divided, and frequently furnished with tendrils. *Flowers* hermaphrodite, irregular; generally small; purple, white, or yellow; and arranged in racemes which are sometimes terminal, and sometimes opposite the leaves. The *Calyx* has two very small, flat, opposite, deciduous, petal-like segments. The *Corolla* is irregular, tubular, formed of four unequal petals, sometimes slightly united at their base, two being internal and

Fig. 33. *Corydalis bulbosa*.

two external; the superior or external one is the largest, and drawn out at the base into a hollow spur. *Stamens* six, united by the filaments in two bundles, and each bearing three anthers at their summit, the middle one being two-celled, and the two lateral one-celled. *Ovary* free, one-celled, containing from one to four, or a great number of ovules, attached to two longitudinal placentæ. *Style* short, thread-like, terminated by a depressed two-lobed stigma. *Fruit* dry, either one-celled, one-seeded, and unopening; or in the form of a pod, many-seeded, and either opening by two valves, or succulent and not opening, as in *Hypecoum*, Fig. A-B. *Seed* shining, black, and furnished with a very thick fleshy *albumen*, which contains the small lateral embryo.

TRIBE I. *Hypecoææ*.—Stamens free.

GENERA AND SYNONYMES.

Hypecoum, T.
Mnemosilla, Forsk.

Chiadzpermum, Bernh. | *Pteridophyllum*, Sieb.

TRIBE 2. *Fumariæ*.—Stamens united by their base in two bundles.

GENERA AND SYNONYMES.

<i>Dactylicapnos</i> , <i>Will.</i>	<i>Bicuculata</i> , <i>Mrch.</i>	<i>Borkhausenia</i> ,	<i>Sarcocapnos</i> , <i>DC.</i>
<i>Dielytra</i> , <i>Borkh.</i>	<i>Adlumia</i> , <i>Raf.</i>	[<i>Fl. W.</i>	<i>Cysticapnos</i> , <i>Boer.</i>
<i>Diclytra</i> , <i>DC.</i>	<i>Bicucula</i> , <i>Borkh.</i>	<i>Capnites</i> , <i>Endl.</i>	<i>Corydalis</i> , <i>Neck.</i>
<i>Dicentra</i> , <i>Borkh.</i>	<i>Phacocapnos</i> , <i>Bernh.</i>	<i>Bulbocapnos</i> , <i>Bernh.</i>	<i>Capnocystis</i> , <i>Juss.</i>
<i>Capnorchis</i> , <i>Brkh.</i>	<i>Corydalis</i> , <i>DC.</i>	<i>Capnites</i> , <i>DC.</i>	<i>Fumaria</i> , <i>T.</i>
<i>Macrocapnos</i> ,	<i>Capnoides</i> , <i>Boer.</i>	<i>Discocapnos</i> , <i>Ch. & S.</i>	<i>Platycapnos</i> , <i>DC.</i>
[<i>Royle.</i>	<i>Neckeria</i> , <i>Scop.</i>		

GEOGRAPHICAL DISTRIBUTION.—The Fumitories or Smoke-worts inhabit the temperate regions of the northern hemisphere, chiefly far inland. They are found in North America and at the Cape of Good Hope, but there are none between the tropics.

PROPERTIES AND USES.—None of the plants belonging to this family are poisonous; on the contrary, they appear to be possessed of a tonic principle, which is contained in the bitter juice of their stalks and leaves. They contain mucilage, saline substances, and a peculiar acid called *Fumaric Acid*.

Fumariæ.—The type of the family is *Fumaria officinalis*, Common Fumitory, or Smoke-wort, found growing so very abundantly in almost all corn-fields and cultivated grounds. The whole plant may be used medicinally; but it is in the leaves that the greatest virtue resides. These are inodorous, have an intensely bitter saline taste, are very succulent, mixed with mucilage, yielding by expression a juice which has the sensible and medicinal properties of the plant, and which on evaporation furnishes an extract and throws out upon its surface a copious saline efflorescence. It is gently tonic, in large doses said to be laxative and diuretic; and is employed in scorbutic affections, chronic eruptions on the skin, and as an excitant to the stomach in convalescence after fevers of long duration. Other species possess the same medicinal properties; such are *F. media* and *spicata*. In Picardy the plant is used to curdle milk.

Corydalis bulbosa, Fig. 33, and other tuberous rooted members of this family, are sometimes, but rarely, used in medicine. They are less bitter and less active, and their bulbous root-stocks contain an acrid resin, and an alkaloid substance which has been called *Corydaline*. The tuber of *C. bulbosa* is aromatic, intensely bitter, moderately astringent and acrid, and was formerly used as a substitute for Birthwort in expelling intestinal worms. All the family possess more or less of the properties of the preceding.

Dielytra cucullaria, a native of the United States of America, is very aptly called *The Dutchman's Breeches*, from the two horns at the base of the flower; and that beautiful plant *D. spectabilis*, lately introduced by Mr. Fortune from the north of China, has now become an established favourite as one of our gayest border flowers.

ORDER XIII.—CRUCIFERÆ—THE CROSS FLOWERS.

THIS is one of the most extensive and natural families of the Vegetable Kingdom. It is composed for the most part of annual, biennial, or perennial herbaceous plants, and a few of half-shrubby character. The

Leaves are alternate, simple, more or less deeply cut, and without leaflets at the base of the leaf-stalks. *Flowers* hermaphrodite, regular; at first disposed in the form of a corymb before opening, but afterwards lengthening out into a panicle or raceme. *Calyx* with four segments, in aestivation valvate (Fig. 12), or imbricate (Fig. 11), and which early fall off after expanding. *Corolla* composed of four petals, clawed at the base, and arranged opposite each other in the form of a cross, hence the name of the family.

Stamens six, four of which are longer than the other two, and placed close to each other in pairs, the two smaller are opposite each other; at

their base there are two or four glands, one between each pair of large

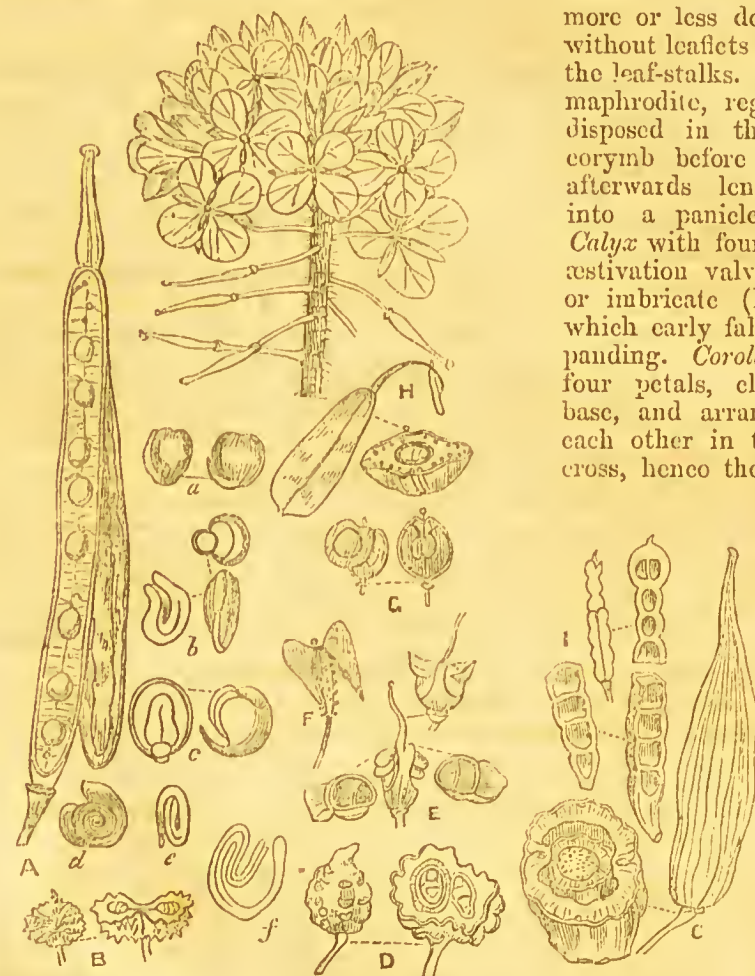


Fig. 34. Flower of *Sinapis alba*—White Mustard.
A—H, Siliques and silicles of the family. a—f, Embryos of ditto.

stamens, and a larger one between each of the small. *Ovary* superior, free, with two cells which are separated by a partition; each cell contains one or more ovules attached to the outer side of this partition, Fig. A. The *Style* is short, sometimes wanting, appears to be a continuation of the

partition, and is terminated by a two-lobed *Stigma*. The *Fruit* is a silique, Fig. A, or a silicle, Fig. G, dry, one or many-seeded, and opening in two valves; or unopening, one-celled and one-seeded. *Seeds* are attached on each side of the partition, and are without albumen; they are generally pendulous, being suspended by an umbilical thread. *Embryo* with oily seed-leaves, which are folded in various ways in relation to the radicle, and sometimes folded on themselves, Fig. d; and on these arrangements of the seed-leaves are the characters of the following sub-orders founded.

This great family is divided into the six following sub-orders:—*Pleurorhizææ*, *Notorhizææ*, *Orthoploceææ*, *Spirolobeææ*, *Diplocolobeææ*, and *Schizopetaleææ*.

SUB-ORDER I.—PLEURORHIZÆÆ.

Seed-leaves flat, with the radicle bent along their edges, Fig. a, and hence called accumbent.

TRIBE 1. *Arabidææ*.—Fruit a silique, opening with a linear partition which is more or less broader than the seeds, Fig. A. Seeds oval, compressed, usually margined.

GENERA AND SYNONYMES.

Matthiola, <i>R. Br.</i>	„ Dichroanthus, <i>W.</i>	Barbarea, <i>R. Br.</i>	Phœnicaulis, <i>Nutt.</i>
Leucojum, <i>Mön.</i>	[& <i>B.</i>	Streptanthus, <i>Nutt.</i>	Macropodium, <i>RBr</i>
Triceras, <i>Andrz.</i>	Jodanthus, <i>T. & G.</i>	Turritis, <i>Dill.</i>	Cardamine, <i>L.</i>
Notoceras, <i>R. Br.</i>	Clausia, <i>Trotzk.</i>	Pachyneurum, <i>Bng.</i>	Pteroneurum, <i>DC.</i>
Diceratium, <i>Ait.</i>	Oudneya, <i>R. Br.</i>	Arabis, <i>L.</i>	Dentaria, <i>T.</i>
Parolinia, <i>Webb.</i>	Nasturtium, <i>R. Br.</i>	Abazicarpus,	Leavenworthia, <i>Tr</i>
Andrzeiowskya,	Sisymbrium, <i>Mag</i>	[<i>Andrz.</i>	Alyssopsis, <i>Boiss.</i>
[<i>Rch.</i>	Baumerta, <i>Fl. W.</i>	Stevenia, <i>F. & A.</i>	Blennodia, <i>R. Br.</i>
Cheiranthus, <i>R. Br.</i>	Radicula, <i>Dill.</i>	Parrya, <i>R. Br.</i>	Microstigma,
	Roripa, <i>Scop.</i>	? Ermannia, <i>Cham.</i>	[<i>Trautv</i>

TRIBE 2. *Alyssidææ*.—Fruit, a silicle, opening lengthwise; partition, broad, oval, and membranous; valves flat or concave, Fig. G, as in *Alyssum calycinum*. Seeds compressed, usually margined.

GENERA AND SYNONYMES.

Lunaria, <i>L.</i>	Alyssoides, <i>Medik</i>	Odontarrhena,	Gansblum, <i>Ad.</i>
Ricotia, <i>L.</i>	Colutocarpus,	[<i>C.A.M.</i>	Cochlearia, <i>L.</i>
Scopolia, <i>Ad.</i>	[<i>Boiss.</i>	Ptilotrichum,	Raphanis, <i>Mö.</i>
Brachypus, <i>Led.</i>	Koniga, <i>Ad.</i>	[<i>C.A.M.</i>	Grællsia, <i>Boiss.</i>
Farsetia, <i>Torr.</i>	Clypeola, <i>Neck.</i>	Clypeola, <i>L.</i>	Pringlea, <i>Hook f.</i>
Alyssum, <i>Ad.</i>	Octadenia, <i>R. Br.</i>	Fossclina, <i>Scop.</i>	Glasteria, <i>Boiss.</i>
Meniocus, <i>Desv.</i>	Loëularia, <i>DC.</i>	Peltaria, <i>L.</i>	Buchingera, <i>Boiss.</i>
Berteroa, <i>DC.</i>	Glyce, <i>Lindl.</i>	Bohatschia, <i>Crz.</i>	Synthlipsis, <i>A. Gr.</i>
Alysson, <i>Medik.</i>	Schiwerckia, <i>Andrz.</i>	Petrocallis, <i>R. Br.</i>	Holargidium, <i>Turcz</i>
Mönchia, <i>Roth.</i>	Aurinia, <i>Desv.</i>	Zizia, <i>Roth.</i>	Tetrapoma, <i>Turcz.</i>
Stevena, <i>Andrz.</i>	Psilonema, <i>C.A.M.</i>	Draba, <i>L.</i>	Tetraecellion,
Aubrietia, <i>Ad.</i>	Alyssum, <i>L.</i>	Odontoeyclus <i>Turcz</i>	[<i>Turcz</i>
Vesicaria, <i>Lam.</i>	Adyseton, <i>Scop.</i>	Erophila, <i>DC.</i>	Selenia, <i>Nutt.</i>

TRIBE 3. *Thlaspidææ*.—Fruit, a silicle and opening; with a very narrow partition, and keeled boat-like valves, Fig. F, as in *Thlaspi Bursa-pastoris*. Seeds oval, sometimes margined.

GENERA AND SYNONYMES.

Didymophysa,	Teesdalia, <i>R. Br.</i>	Cynocardamum, <i>W.</i>	Diastrophis, <i>F. & M.</i>
[<i>Boiss.</i>	Guepinia, <i>Bart.</i>	[<i>& B.</i>	Megacarpæa, <i>DC.</i>
Thlaspi, <i>Dill.</i>	Iberis, <i>Dill.</i>	Heldreichia, <i>Boiss.</i>	Crenularia, <i>Boiss.</i>
Pterolobium,	Iberis, <i>L.</i>	Zygopeltis, <i>Fenzl.</i>	Moriera, <i>Boiss.</i>
[<i>Andrz.</i>	Arabis, <i>Ad.</i>	Biseutella, <i>L.</i>	Cremolobus, <i>DC.</i>
Lyroearpa, <i>Harv.</i>	Thlaspidium,	Dithyrea, <i>Harv.</i>	Menonvillea, <i>DC.</i>
Brossardia, <i>Boiss.</i>	[<i>Andrz.</i>		

TRIBE 4. *Euclidieæ*.—Fruit, a silicle and unopening; valves concave, indistinct, or not separating; partition elliptical, and sometimes almost wanting. Seeds oval, very few.

GENERA AND SYNONYMES.

Euclidium, <i>R. Br.</i>	Ochthodium, <i>DC.</i>
Soria, <i>Ad.</i>	Bunias, <i>Desv.</i>
Hierochontis, <i>Medik.</i>	Pugionium, <i>Gärt.</i>

TRIBE 5. *Anastatieæ*.—Fruit, a silicle opening longitudinally; valves concave, bearing on the inside transverse, horizontal, small, partitions separating the seeds, Fig. E, as in *Anastatica hierochuntica*. Seeds without a margin.

GENERA AND SYNONYMES.

Anastatica, <i>Gärtn.</i>	Morettia, <i>DC.</i>
Hierocontis, <i>Ad.</i>	Neetouxia, <i>DC.</i>

TRIBE 6. *Cakilidæ*.—Fruit either a silique or a silicle, separating transversely into one or two-celled, one or two-seeded joints. Seeds without a margin.

GENERA AND SYNONYMES.

Cakile, <i>T.</i>	Chorisporea, <i>DC.</i>	Cordylocarpus, <i>Desf.</i>
	Chorispermum, <i>R. Br.</i>	

SUB-ORDER II.—NOTORHIZEA.

Seed-leaves flat, with the radicle bent on to the back of one of them, Fig. b, and hence called incumbent. Seeds ovate, without a margin.

TRIBE 7. *Sisymbrieæ*.—Fruit a silique, 2-celled, opening lengthwise; valves, concave or keeled. Seeds, ovate or oblong, without a margin.

GENERA AND SYNONYMES.

Malcomia, <i>R. Br.</i>	„ Kluckia, <i>Andrz.</i>	Tropidocarpum,	Syrenopsis, <i>Jaub.</i>
Hesperis, <i>L.</i>	Chamaeplum,	[<i>Hook.</i>	Leptaleum, <i>DC.</i>
Citharolomia, <i>Bung</i>	[<i>Wallr.</i>	Erysimum, <i>L.</i>	Christolea, <i>Camb.</i>
Dontostemon, <i>Andrz.</i>	Leptocarpæa, <i>DC.</i>	Cheirinia, <i>Link. p.</i>	Thelypodium, <i>Endl.</i>
Andreoskia, <i>DC.</i>	Deseurainia, <i>W.</i>	Gorinkia, <i>Presl.</i>	Pachypodium,
Hesperidopsis,	[<i>& B.</i>	Crantzia, <i>Lagasc.</i>	[<i>Nutt.</i>
[<i>DC.</i>	Sophia, <i>Hall.</i>	Tetraeme, <i>Bunge.</i>	Stanleya, <i>Nutt.</i>
Tonguea, <i>Endl.</i>	Hugueninia, <i>Roh.</i>	Tatraaceratum,	Podolobus, <i>Raf.</i>
Pachypodium, <i>W.</i>	? Halimolobus,	[<i>DC.</i>	Warea, <i>Nutt.</i>
[<i>& B.</i>	[<i>Tausch.</i>	Taphrospermum,	Greggia, <i>A. Gray.</i>
Sisymbrium, <i>L.</i>	Drabopsis, <i>Koch.</i>	[<i>C. A. M.</i>	Strophades, <i>Boiss.</i>
Erysimum, <i>T.</i>		Braya, <i>Stern. & Hopp</i>	Zerdana, <i>Bois.</i>

TRIBE 8. *Camelinæ*.—Fruit a silicle with concave valves, and an elliptical partition in its greatest diameter. Seeds ovate.

GENERA AND SYNONYMES.

<i>Syrenia</i> , Andr.	<i>Menkea</i> , Lehm.	<i>Eutrema</i> , R. Br.	„ <i>Orobium</i> , Rch.
<i>Stylonema</i> , DC.	<i>Stenopetalum</i> , R. Br.	<i>Smelowskia</i> ,	<i>Oreas</i> , Cham.
<i>Camelina</i> , Crantz.	<i>Eudema</i> , H. & B.	[C.A.M.]	<i>Platyspermum</i> , Hk.
<i>Myagrum</i> , DC.	<i>Mathewsia</i> , Hook	<i>Aphragmus</i> , Andr.	<i>Parlatoria</i> , Boiss.
<i>Leiolobium</i> , DC.	<i>Platypetalum</i> , R.Br.		

TRIBE 9. *Lepidiæ*.—Fruit a silicle with a very narrow partition; valves keeled or very concave, Fig. f. Seed solitary in the cells, or very few ovate, and without a margin.

GENERA AND SYNONYMES.

<i>Capsella</i> , Vent.	<i>Bivonæa</i> , DC.	„ <i>Jundzillia</i> , Andr.	<i>Hymenophysa</i> ,
<i>Thlaspi</i> , L.	<i>Eunomia</i> , DC.	<i>Nasturtium</i> , Bör.	[C.A.M.]
<i>Rodschiedia</i> ,	<i>Hutchinsia</i> , R. Br.	<i>Lasioptera</i> , Andr.	<i>Æthconema</i> , R. Br.
[Gärt.]	<i>Nocæa</i> , Rch.	<i>Nasturtioides</i> ,	<i>Campyloptera</i> , Bois
<i>Bursa</i> , Guett.	<i>Nasturtiolum</i> , Gr	[Medik.]	<i>Hexaptera</i> , Hook.
<i>Bursa Pastoris</i> , T.	<i>Lepidium</i> , R. Br.	<i>Senckenbergia</i> ,	? <i>Dispeltophorus</i> ,
<i>Hymenolobus</i> , Nutt	<i>Kandis</i> , Ad.	[Fl. W.]	[Lehm.]
<i>Ionopsidium</i> , Rch.	<i>Cardiolepis</i> , Willr	<i>Physolepidium</i> ,	
		[Schrk.]	

TRIBE 10. *Isatidæ*.—Fruit a silicle, one-celled, from the partition having vanished; one-seeded, with indistinct or unopening keeled valves, Fig. h. Seeds ovate, oblong.

GENERA AND SYNONYMES.

<i>Tetrapterygium</i> , F.	<i>Chastoloma</i> , Bunge.	„ <i>Glasteria</i> , Boiss.	„ <i>Bricour</i> , Ad.
[& M.]	<i>Thysanocarpus</i> , Hk	<i>Boreava</i> , Jaub.	<i>Deltocarpus</i> , Her.
<i>Isatis</i> , L.	<i>Physorynchus</i> , Hk.	<i>Neslia</i> , Desv.	<i>Sinistrophorum</i> ,
<i>Pachypterygium</i> ,	<i>Sobolewskia</i> , Bieb.	<i>Vogelia</i> , Med	[Schrk.]
[Bunge.]	<i>Macrosporum</i> , DC	<i>Rapistrum</i> , Hall.	<i>Traillia</i> , Lindl.
<i>Tauscheria</i> , Fisch.	<i>Texieria</i> , Jaub.	<i>Myagrum</i> , T.	<i>Lachnoloma</i> , Bunge

TRIBE 11. *Anchoniæ*.—Fruit either a silicle or silique, separating transversely into one-seeded joints.

GENERA AND SYNONYMES.

<i>Goldbachia</i> , DC.	<i>Sterigma</i> , DC.	„ <i>Anthrolobus</i> , Stev	<i>Cryptospora</i> , Kar.
<i>Anconium</i> , DC.	<i>Sterigmotemon</i> ,	<i>Morisia</i> , Gay.	<i>Hussonia</i> , Boiss.
	[Bieb.]		

SUB-ORDER III.—ORTHOPLOCEÆ.

Seed-leaves ineumbent, folded together, or plaited lengthwise through their middle, and inwrapping the radicle in the recess, Fig. c. Style usually enlarged, with a cell and seed at its base. Seeds generally globose, always without a margin.

TRIBE 12. *Brassicæ*.—Fruit a silique with the valves opening lengthwise and a linear partition, Fig. a.

GENERA AND SYNONYMES.

<i>Sinapidendron</i> ,	„ <i>Napus</i> , T.	<i>Bonania</i> , Presl.	<i>Orycophragmus</i> ,
[Lowe.]	<i>Sinapis</i> , T.	<i>Donceia</i> , Camb.	[Bunge.]
<i>Disaccium</i> , DC.	<i>Sinapistrum</i> , Rch	<i>Erucastrum</i> , Presl.	<i>Diploaxis</i> , DC.
<i>Brassica</i> , L.	<i>Rhaphosper-</i>	<i>Güntheria</i> , Andr.	<i>Eruca</i> , T.
<i>Rapa</i> , T.	[mum Andr.]	<i>Moricandia</i> , DC.	<i>Euzomum</i> , Link.

TRIBE 13. *Velleæ*.—Fruit a silicle, with concavo valves opening lengthwise and an elliptical partition. Seeds globose.

GENERA.

Vella, <i>DC.</i>	Stroganovia, <i>Kar.</i>	Carrichtera, <i>DC.</i>	Savignya, <i>DC.</i>
Boleum, <i>Desv.</i>	Stuebendorfia, <i>Schr.</i>	Succowia, <i>Medik.</i>	

TRIBE 14. *Psychinæ*.—Fruit a silicle with keeled or boat-shaped valves, and very narrow partition, Fig. F.

GENERA.

Schouwia, *DC.* | Psychine, *Desf.* | Cyclopterygium, *Hochst.*

TRIBE 15. *Zilleæ*.—Fruit a silicle, unopening, ovate or globose, one-celled, one-seeded. Valves distinct, seeds globose.

GENERA AND SYNONYME.

Zilla, *Forsk.* | Muricaria, *Desv.* | Calcepinia, *Adans.* | „, Rapistrum, *Bergr.*

TRIBE 16. *Raphanæ*.—Fruit a silicle or silique, separating transversely into one or few-seeded joints or cells, Fig. c. Seeds globose.

GENERA AND SYNONYMS.

Crambe, <i>T.</i>	„, Condyllocarya,	Enarthrocarpus,	„, Ormycarpus, <i>Nck.</i>
Rapistrum, <i>Medik</i>	[Bess.]	[Labill.]	Durandea, <i>Delarb.</i>
Rapistrum, <i>Börh.</i>	Anthrolobus,	Raphanistrum, <i>T.</i>	Raphanus, <i>T.</i>
Schrankia, <i>Medik</i>	[Andrz.]	Dondisia, <i>Neck.</i>	Hemicrambe, <i>Webb.</i>
	Didesmus, <i>Desv.</i>		

SUB-ORDER IV.—SPIROLOBÆÆ.

Seed-leaves incumbent, linear, twisted into a spiral, or rather coil, Fig. d,

TRIBE 17. *Buniadæ*.—Fruit a silicle, in the form of nuts which are unopening, two to four-celled, Fig. d. Seed-leaves twisted into a coil, Fig. d.

GENUS.

Bunias, *R. Br.*

TRIBE 18. *Erucaridæ*. Fruit a silique, two-jointed, which when ripe falls in pieces at the joints; the lower joint two-celled, and the upper one sword-shaped, Fig. i. Seed-leaves folded back, somewhat spiral, Fig. e.

GENERA.

Erucaria, *Gärtn.* | Cycloptychis, *E. Mey.*

SUB-ORDER V.—DIPLOCOLOBÆÆ.

Seed-leaves incumbent, linear, with two legs, or a double plait; that is, plaited twice cross-wise, Fig. f. Seeds depressed.

TRIBE 19. *Heliophilidæ*.—Fruit an elongated silique, rarely oblong or oval; partition linear or oval. Valves flat, or, in those with elongated siliques, they are rather convex.

GENERA AND SYNONYME.

Camira, *Thunb.* | *Heliophila*, *N. Burm.* |, *Trentepohlia*, *Roth.*

TRIBE 20. *Subularidæ*.—Fruit a silicle with an elliptical partition, convex valves, many seeded cells, and a sessile stigma.

GENUS AND SYNONYME.

Subularia, *DC.*
Consana, *Ad.*

TRIBE 21. *Senebieridæ*.—Fruit, two silicles united with a very narrow partition; valves much inflated; cells one-seeded; style short, Fig. B.

GENERA AND SYNONYME.

Senebiera, *Poir.* | *Monoploca*, *Bunge.* | *Brachycarpæa*, *DC.*
Coronopus, *Hall.*

SUB-ORDER VI.—SCHIZOPETALEÆ.

Seed-leaves spirally twisted. Petals pinnatifid.

GENERA.

Schizopetalon, *Hook.* | *Peyreymondia*, *Barnéoud.*

DOUBTFUL GENERA.

Redowskia, *Ch. & Schl.* | *Schimpera*, *St. & Hochst* | *Discovium*, *Raf.*

GEOGRAPHICAL DISTRIBUTION.—The *Cruciferae* are distributed over the whole surface of the globe. The greatest number is found in the temperate regions of the northern hemisphere, particularly of the Old World; but they become more rare towards the poles, and rarer still towards the tropics. While, according to De Candolle, there are 518 in the north temperate zone, there are 86 in the south temperate; and against 30 growing between the tropics, there are 205 found in the north frigid zone.

PROPERTIES AND USES.—All the parts of the plants of this family are distinguished by a volatile acidity, often united with nitrogen and sulphur, which cause them to emit such a disagreeable odour during decomposition. None of them are poisonous, but their properties are antiscorbutic, pungent, and stimulant. Here are found some of the most important and valuable of our garden vegetables and farm plants. The Cabbage tribe, including the Broccoli, Cauliflowers, and all kinds of culinary winter greens; the Mustard, Cress, Water-cress, Radish, Turnip, Sea-Kale, and numerous others, all belong to this extensive family. It is to the presence of a volatile oil that the *Cruciferae* owe their acrid and pungent flavour, and their more or less aromatic odour. Some authors have attributed them to the presence of ammonia in these plants; but this substance does not exist in a fixed state; analysis has not been able to detect it in the recent juice or in the distilled water; but as these plants contain much nitrogen, it may be that during fermentation it may form ammonia by the decomposition of the water. This oil exists in the whole of the family, and in all the organs of these plants, but with various degrees of intensity, so that it renders them either simply exciting, or more or less irritant: thus the root of the Horse-radish, the large leaves of the Garden-cress, the seeds of different kinds of Mustard, produce redness, and even inflammation on the skin, when applied for a

certain space of time. This is not the case, however, in a great number of the plants of this family; the acrid and volatile principle only exists in such proportions that their acrid flavour is subdued by the presence of a sufficient quantity of water or of mucilage to render them agreeable. The leaves of different species of Cress, of Scurvy-grass, Water-cress, and, in general, the greater part of this family, are useful, either alimentarily or medically; but, as their active principle is very fleeting and volatile, they should always be used in a fresh state.

The medical action of the Cruciferæ is active and instantaneous. They stimulate energetically the different functions of the constitution, or act more especially on only one of them. In the first case they rank among the general stimulants, and are called antiscorbutics, because it is against the scurvy that they are most frequently, and with the greatest advantage, employed. In the other case, they are considered emmenagogue, sudorific, or diuretic, according as they stimulate the relative organs.

From this family we also obtain a great number of wholesome and nutritious vegetables, which have been obtained by the cultivation of the wild species. Such are the Cabbage, Brocoli, Cauliflower, Radish, and Turnip, which, by culture, have acquired a development of watery, sugary, and mucilaginous principles, which tend to destroy or conceal the acrid taste so prevalent in those in a wild state.

Another uniformity of character is found in the seeds. Besides the volatile principle which exists more or less in all, in different degrees, they contain a greater or less quantity of fat oil, which is obtained by expression.

Arabidæ.—In this tribe we meet with some of the greatest favourites of the flower-garden—the Ten-week, the Brompton, and the Queen's-stock; the Wallflower, the Yellow Rockets, the Dame's Violets, the pretty Wall-creesses, the Water-cress, and the Winter-cress.

Nasturtium officinale, or *Common Water-cress*, is met with in the wild state in rivulets, springs, and ponds, throughout almost the whole of this country, and is extensively used as a wholesome and beneficial salad. Like all the members of the family to which it belongs, it is useful in scorbutic affections and visceral obstructions. The Water-cress, which was formerly obtained from the natural beds only, is now extensively cultivated in several places in the neighbourhood of London, for the supply of the metropolitan, and, indeed, the provincial markets also. The best Water-cress beds are on chalky or gravelly soils, and hence those about Winchester, watered by the Itchen, those at Riverhead, in Kent, and at the source of the Thames, near Cirencester, in Gloucestershire, have long been celebrated. But, when the plant is cultivated artificially, and if the rills to be planted are muddy at the bottom, the mud must be removed, and a bed of gravel substituted. The depth of water requisite for the culture of the Water-cress is from four to five inches, and the width of the bed can be regulated according to circumstances; but in planting such a bed, or in gathering Water-creesses from natural beds, great care should be observed not to mistake that poisonous plant *Sium nodiflorum*, or Water-parsnip, which so much resembles the Water-cress. The Water-cress has been found to contain iodine.

Barbarea præcox is cultivated under the names of *American Cress* and *Belleisle Cress*, and is esteemed by many as a spring salad. It has the

flavour of the Water-cress, and those who are partial to that flavour, without being able to obtain the true Water-cress, frequently cultivate this throughout the whole year as a substitute. *B. vulgaris*, cultivated by the name of *Winter Cress*, and called by the French *Herbe de Ste. Barbe*, is also used as a salad plant in the spring; but it has a nauseous, bitter taste, and is in some degree mucilaginous. In Sweden it is used as a culinary vegetable, the leaves being used as we do kale.

Cardamine pratensis (Fig. 35), that beautiful wild-flower of spring, clothing as with a bridal mantle our moist meadows and river banks, and known by the name of *Lady's Smock* and *Cuckoo Flower*, is also used as a salad in the north of Europe. The leaves are slightly pungent and somewhat bitter; and from the whole plant the juice is expressed, and taken in a dose of a wine-glassful by the inhabitants of northern countries, who live extensively on salt fish and meats. It is esteemed an excellent remedy in scorbutic diseases, obstructions of the liver and jaundice. About a century ago it was highly extolled as a remedy against epilepsy; but taken inwardly, it has little sensible effect upon the system, and is therefore only regarded as a popular nostrum.

Dentaria diphylla, or *Toothwort*, is used by the natives of North America, by whom it is called *Pepper-root*; the roots having a pungent, mustard-like taste. *D. bulbifera*, which grows wild in most shady woods in England, is said, when dried, to have a greater pungency than the Pellitory of Spain, and was formerly used as a remedy for toothache.

Alyssidæ.—Unless it be for their botanical or floral interest, there are none of the plants of this tribe which command much attention; and those only which possess any properties recommending them for economical purposes are *Cochlearia armoracia*, the *Horse-radish*, and *C. officinalis*, the *Common Scurvy Grass*. The former, being so well known, requires little or no description. It is highly stimulant, exciting the stomach when eaten, and promoting the secretions, especially that of urine. It has been recommended in palsy, chronic rheumatism, dropsical complaints, and in cases of enfeebled digestion; but its chief use is as a condiment, to promote appetite, and to excite the digestive organs. The virtues of Horse-radish depend upon a volatile oil, which is dissipated in drying, and they may be imparted to water and to alcohol. The oil, which may be obtained by distillation with water, is colourless, or pale yellow, heavier than water, very volatile, excessively pungent, acrid, and corrosive, exciting inflammation and even blisters on the skin; it is partly soluble in water, to which it communicates the inflammatory properties, and is quite soluble in alcohol; but when the root is distilled with alcohol, no oil is obtained. It contains sulphur to the



Fig. 35. *Cardamine pratensis*.

extent of thirty per cent. in the number of its elements, and it is to the presence of this body in Horse-radish that the metal vessels in which it is distilled are turned to a black colour. It is one of the most powerful excitants and antiscorbutics which we have, and forms the basis of several medical antiscorbutic preparations, in the form of syrups, wines, and tinctures. The *Common Scurvy Grass* is also a powerful antiscorbutic. It possesses the greatest vigour when it is coming into flower, for then its leaves are charged with an aerid and pungent juice, which, when the plant is bruised, gives out a volatile and irritant exhalation. Scurvy Grass contains the same aerid, sulphureous oil, which exists in Horse-radish, and is almost always applied either with or to the same purpose as that is.

Thlaspidæ.—This tribe, which contains the little *Shepherd's Purse*, an abundant and troublesome weed in most gardens, presents us also with the gay and fragrant *Candytufts* of our annual flower borders. It does not furnish many plants remarkable either for their economical or medicinal properties, the only instance being *Iberis amara*, or *Bitter Candytuft*, which is a small annual plant common in the corn-fields of this country. The root, stem, and leaves, are said to possess medicinal properties, but the greatest virtue rests in the seed. In large doses it produces giddiness, nausea, and diarrhœa, but its virtues do not seem to be associated with any perceptible physiological effect. It is thought to exercise a happy influence over the excited actions of the heart, and is especially useful in hypertrophy; but much advantage is said to have accrued from it in asthma, bronchitis, and dropsy. The dose of the seed is from one to two grains.

Anastaticæ.—The remarkable plant which is the type of this tribe grows in the arid wastes of Egypt, Palestine, and Barbary; on the roofs of houses, and among rubbish in Syria; and on the sandy deserts of Arabia. It is *Anastatica hierochuntica*, the *Rose of Jericho*, which the monks of old invested with such miraculous powers, and which the people regarded with such superstitious veneration. The plant is small, bushy, and not above six inches high; after it has flowered, the leaves fall off, the branches and branchlets dry and shrivel up, incurving towards the centre, and, in fact, forming the plant into a sort of ball. They are easily uprooted from the sand by the winds, and are carried, blown and tossed, across the desert into the sea. When they come in contact with the water, the plant unfolds itself, the branches are expanded, the seed-vessels open and relieve the seeds, which are conveyed by the tide, and deposited again on the shore. They are carried hence by the winds away into the desert again, and there they take root, producing plants, which, in their turn, perform the same strange part in the economy of creation. It was to this property of expanding when placed in contact with moisture, which induced the miraculous and superstitious importance of the plant, and it was believed that this appearance always took place on the anniversary of the birth of our Blessed Saviour. The plant may be kept for years, if taken up before it is withered, and then preserved in a dry room; at any time when the root is put in a glass of water, or the whole plant immersed, it will expand, and, in the course of a few hours, the buds of flowers will swell, and appear as if newly taken from the ground. It is called, also, *Rosa Mariæ*.

Sisymbriæ.—In this tribe we have the pretty little *Virginian Stock*, *Malcoma maritima*, so gay and yet so modest, whether smiling on the

window-sill of a smoke-wreathed tenement of our large towns, or edging the approach to some happy home, fragrant with honeysuckles, and clematis, in the quiet retirement of a country lane. Here we have also the *White Rockets*, or *Dames' Violets* (*Hesperis matronalis*), and the *Night-scented Rocket* (*H. tristis*).

Sisymbrium officinale, or *Hedge-mustard*, is not so acrid or pungent as the great part of the Cruciferæ—its leaves being rather bitter and astringent, and employed in infusion for pulmonary catarrh. The herb is said to be diuretic and expectorant, and has been recommended in chronic coughs, hoarseness, and ulcerations of the mouth and fauces. *S. Irio*, or *London Rocket*, has the hot flavour of mustard. *S. Sophia*, or *Flix weed*, is of a pungent odour, and an acrid, bitter taste. It was formerly given in dysenteries and hysterical cases, and the seeds were considered as a vermifuge. The seeds, mixed to the extent of one-tenth part of the other ingredients, are said to augment the force of gunpowder.

Erysimum alliaria, commonly called *Jack-by-the-hedge*, or *Sauce alone*, emits from all its parts, and particularly from the seeds, a strong odour of garlic. It was formerly used by the country-people in sauces, along with salted meat, with bread and butter, and in salads; and therefore called "Sauce alone." It is found growing by the sides of hedges, and hence the origin of the other name. Although it is now almost totally disregarded, it may be used with considerable advantage. The late Dr. Neill states, that "when gathered as it approaches the flowering state, boiled separately, and then eaten to boiled mutton, it certainly forms a most desirable pot-herb; and to any kind of salted meat, an excellent green."

Camelineæ.—*Camelina sativa*, or *Gold of Pleasure*, is extensively cultivated on the Continent, particularly in France, Germany, and Belgium, for the oil which is expressed from its seeds; and in some parts it is an important crop in agricultural cultivation. The oil of *Camelina* is nearly inodorous, and gives a brighter flame, with less smoke, than that of either Rape or Mustard. It is considered the least in value of all the oils of this family, but is good for scouring cloths, and—in winter only—for making a soft soap. It is not drying, neither is it considered applicable for domestic purposes. The stems of this plant are tough, fibrous, hard, and durable, and are used as a thatching for temporary buildings, and for making brooms, sackcloth, sail-cloth, and packing-paper.

Lepidineæ.—In this tribe we have *Lepidium sativum*, the *Common Garden Cress*, of which there are several varieties, including the *curled-leaved* and the *broad-leaved*. The whole plant has a warm, slightly acrid, and pungent taste, but is mild and agreeable, and is well known as furnishing, with mustard, one of the most common and popular salads. The leaves and the roots of *L. latifolium* have an acrid and peppery flavour, and, applied to the skin, speedily produce irritation. The whole plant is of energetic action, and is one of the most powerful antiscorbutics. The leaves having been used by country-people as a condiment to their viands, instead of pepper, it has been called *Poor Man's Pepper*. Other species, as *L. ruderale*, and *L. iberis*, possess the same properties.

Isatidæ.—The most important plant in this tribe is the *Dyer's Wood* (*Isatis tinctoria*), from which a blue dye is obtained, with which the ancient Britons painted their persons, and in consequence of which the northern

inhabitants of our island were called by the Romans, Piets, while those of the south were styled by the Celts, Britons, from the Celtic word *britho*, to paint. In Celtic it is called *glas*, signifying blue, and from this the name of Glastonbury is supposed to have arisen. As an article of commerce, Woad is now of much less value than it formerly was, when it formed a very important feature in English agriculture, its place having been supplied by indigo, which can be produced in much greater quantity and at a considerably cheaper rate. Woad is a native of this country, and is still cultivated to a small extent, affording two crops in the year. It is not our province here to enter into the cultivation of the plant, but as regards its blue product we shall shortly state the mode by which it is obtained. When the plant is ripe, which is known by its first leaves beginning to dry, all the leaves are cut off and laid in a heap to wither, in a place sheltered from the sun and rain, and are frequently turned over to make them heat equally. When properly fermented they are taken to a mill, similar to that used for crushing linseed, and there ground till reduced to a paste, which is afterwards formed into cakes of about a pound weight, and these are laid to dry in a covered place sheltered from sun and rain. In about a fortnight this paste has acquired sufficient consistence to be formed into small roundish lumps by means of little wooden moulds. As fast as they are moulded, they are laid on wicker hurdles to dry, and when they have become hard they are in a condition for market. The dye obtained from Woad makes an excellent blue, and very lasting, but when it is used in the present day it is always in union with indigo, which adds considerably to the improvement of the colour. The leaves of Woad have a fleeting pungent odour, and an acrid durable taste, and have been used in scorbutic affections, jaundice, and other complaints.

Brassicæ.—Of all the tribes of the Cruciferae this is by far the most important, as it contains a number of plants which both in themselves and their products occupy a prominent position in agriculture, commerce, and in domestic economy. It is properly *The Cabbage Tribe*.

On Dover cliffs, and in many places on the coast of Dorsetshire, Cornwall, and Yorkshire, may be seen a wild plant with variously indented, much-waved, and loose, spreading leaves of a sea-green colour and large yellow flowers. In spring the inhabitants collect the leaves of this plant, and, after boiling them in two waters to remove the saltiness, use them as a vegetable along with their meat. This is *Brassica oleracea*, the *Wild Cabbage* or *Colewort*, from which have originated all the varieties of Cabbage, Greens, Cauliflower, and Brocoli. It would be quite beyond the intention of this work to enter minutely into a treatise on all the varieties of the cabbage tribe which are cultivated in gardens, and neither shall we do so; but as it is a subject which is no doubt interesting to many to know somewhat of the arrangement and distribution of these plants, we shall devote a short space to that purpose. Starting with the Wild Cabbage as it is found on the sea-cliffs of this country, we have the plant in its simplest and normal form. In this state it is the true *Colewort* or *Collet*, although the name is now applied to any young cabbage which has a loose and open heart. Brought into cultivation, we have it improved in character, though still with the loose open leaves, and in this form it is called *Greens*, *Kale*, or *Borecole* (*B. oleracea acephala*). Of these there are many varieties

both as regards the form and colour of the leaves, and the height of the plants, and among them are included the *Thousand-headed* and the *Cow* or *Tree Cabbage*. Advancing a step farther in improvement, we find it assuming the headed or hearting character, and with blistered leaves; then it is known by the name of *Savoy*s and *Brussels Sprouts* (*B. o. bullata*). Another of its headed forms, but with smooth glaucous leaves, is the *Cultivated Cabbage* of our gardens (*B. o. capitata*), and all its varieties of green, red, tall, dwarf, early, late, round, conical, flat, and all the forms into which it is possible to squeeze it. A more singular development is that presented by *Kohl-Rabi*, or, as it is sometimes called, *Turnip-Cabbage* and *Knol-Kohl* (*B. o. caulo-rapa*), wherein the stem swells out like a large turnip on the surface of the ground, and from which the leaves proceed all round it, the top surmounted by a large cluster of leaves issuing from it. Although not generally grown as a garden vegetable, if used when young and tender, it is wholesome, nutritious, and very palatable. The only other forms which the Cabbage presents in a cultivated state are those in which we find it under the names of *Carliflower* (*B. o. botrytis cauliflora*) and *Brocoli* (*B. o. botrytis asparagoides*), both of which are so well known as not to require any further remarks.

B. campestris represents also several very important plants, and is known by the names of *Wild Navev* and *Colza*. In this its simplest form it is extensively cultivated in the north of France, Holland, and in Belgium, for its seeds, from which is expressed a valuable oil called *Colza Oil*. It is also grown in England for the same purpose. Colza Oil is much used for burning in lamps, for which it is well adapted, as it produces very little smoke; for scouring cloths, and for domestic purposes. It dries slowly, soon becomes rancid and acrid, and furnishes a soft soap. It contains in a hundred parts forty-six of stearine and fifty-four of oleine. The *Swedish Turnip*, now so extensively cultivated as an agricultural crop, is a form of this plant more fully developed, as is also the *Turnip-rooted Cabbage* (*B. c. Napo-brassica*).

B. rapa is the origin from which the cultivated *Turnip* has sprung, whether of the field or garden varieties. In its wild state it furnishes an oil similar to that of Rape and Colza, but it is less productive in this substance than these are, and is therefore only grown because of its adaptability to poor soils, on which they do not luxuriate. The use of the turnip in its cultivated state is too well known to require any description.

B. napus is the common and cultivated *Rape* or *Colesced*. This plant is extensively cultivated for its herbage, which furnishes an excellent winter food for sheep; and for its seeds, from which is obtained the oil called *Rape Oil*, so extensively used for machinery, the residue, after the oil is expressed, being known among farmers as *Rape Cake*. This cake was used formerly for feeding cows, pigs, and calves during winter; but it is now more highly esteemed and exclusively used as a valuable manure, from the great quantity of nitrogen which it contains. There is a variety of this, called by the French *Chou Navette*, and by us *French Turnip* (*B. n. esculenta*), which is employed in flavouring all the foreign soups. Stewed in gravy it forms a most excellent dish, and being white and of the shape of a carrot, when mixed alternately with those roots on a dish they are very ornamental.

Sinapis nigra, or *Black Mustard*, grows wild in many parts of this country in corn-fields and by way-sides; and *S. alba*, or *White Mustard*, is a native of the south of Europe, but now naturalized in many parts of this country. It is from the ground seed of these two species that *Flower of Mustard*, so much used as a condiment, is obtained. The original *Durham Mustard* was made from the ground seed of *S. arvensis*, the common wild *Charlock*, which grew very plentifully in the neighbourhood of that city; and in places where it abounds, its seed is still collected and sold for the purpose of mixing with the black and white. White Mustard is grown very extensively in the fens of Lincolnshire and Cambridgeshire, in Essex and Kent, but the greater bulk is produced in the fens of the two former counties. Used medicinally, mustard seed swallowed whole is laxative, and a remedy in dyspepsia and other complaints attended with torpid bowels and deficient excitement. The bruised seeds or powder, in the quantity of a large teaspoonful, operate as an emetic. In smaller quantities, it is a safe stimulant of the digestive organs; and, as it is frequently determined to the kidneys it has been beneficially employed in dropsy, administered in the shape of a whey, made by boiling half an ounce of the bruised seeds or powder in a pint of milk, and straining, and a wine-glassful to be taken several times a day. But it is mainly as a rubefacient that Mustard is most highly prized. Mixed with water in the form of a plaster, it very soon produces redness with a burning pain, which, if continued, becomes insupportable. When speedy or violent action is not required, it is generally mixed with rye meal or wheat flour, and care should be taken not to allow the application to continue too long, as blistering with obstinate ulceration may result. Mustard is very rarely to be obtained pure, it being always more or less extensively adulterated; but, as the substitutes are generally of a harmless description, no alarm need be excited on that account, the result being merely less acidity and pungency. Rape-seed, turnip-seed which is too old to vegetate, wild radish, and wheat flour are the principal ingredients; the last is generally added after the seed is ground, but the others are ground along with it. An oil is obtained from the seeds by expression, and called *Oil of Mustard*, which has the same properties as those of the other plants of this family. It is of a greenish-yellow colour, with little smell, and a mild and not unpleasant taste; and yields on saponification an acid for which the name of *Erucic Acid* has been proposed. When the seeds have been pressed and all the fixed oil has been extracted, the residue left behind is much more pungent than the unbruised seeds, and it is from this that the *Volatile Oil of Mustard* is obtained. This is a colourless or pale yellow liquid, rather heavier than water, of an exceedingly pungent odour, and acrid, burning taste, and having sulphur among its essential constituents. It is powerfully rubefacient, capable of speedily raising blisters, and is used by dissolving thirty drops in a fluid ounce of alcohol, or six or eight drops in a fluid drachm of olive or almond oil. In over-doses it is highly poisonous; its odour is perceptible in the blood, and it is said to impart the smell of Horse-radish to the urine. It is from the presence of this volatile oil that the odour and pungency of mustard arises; and as it does not exist ready-formed, but is produced by the agency of water, hence it is that dry mustard is destitute of both taste and smell till it has been moistened. The

peculiar principles in Black Mustard-seed, and in those of the White also, though in a less degree, are *Myronic acid*, which exists in the seeds in the state of *Myronate of potassa*; *Myrosyne*, closely analogous in character to the albuminous constituent of almonds, called emulsin; and *Sinapisin*, a peculiar crystalline principle, which, on contact with water, and the albuminous principles of the seed, emit the odour of the oil of mustard. *Myronic acid* is a fixed, inodorous substance, of a bitter and sour taste and acid reaction. It contains sulphur, nitrogen, carbon, hydrogen, and oxygen. *Myrosyne*, when dry, has the character of an albuminous substance; is soluble in water, forming a viscid solution, which froths when agitated, and is coagulated by heat, alcohol, and the acids. *Sinapisin* is in brilliant, white, scaly crystals, sublimable by heat, soluble in alcohol, ether, and the fixed and volatile oils, but insoluble in acids and alkalies. The peculiar ingredient in White Mustard-seed is *Sulpho-sinapisin*, a white, crystallisable, inodorous, and bitter substance, soluble in alcohol and ether, and forming a yellow solution. The *Oil-cake of Mustard* requires to be given to cattle with great caution, as it is somewhat purgative, and is generally sprinkled on their chaff. The Flour of Mustard used in this country is obtained chiefly from the seeds of White Mustard, while that of France is procured from the Black; hence it is that French Flour of Mustard has always a dark appearance, and a great mixture of dark-coloured specks, arising from the presence of the dark skins of the seeds.

Eruca sativa, *Garden Rocket*, has an acrid and bitter taste, exhaling a strong, disagreeable smell when bruised. It is stimulant and antiscorbutic; the seeds are very acrid, and produce blisters when bruised and applied to the skin.

Raphanææ.—To this tribe belong two well-known garden-plants—the *Sea-kale* and the *Radish*. *Sea-kale* (*Crambe maritima*) is a native of the sea-shore and cliffs of the south and west coasts of England; and for centuries before it was known, as now, at the tables of the great and wealthy, it was an object of special regard in the humble dwellings of the south-coast fishermen; elambering up the cliffs, and swinging themselves, by means of ropes, over precipitous heights, they encountered any amount of danger to obtain, in spring, the tender shoots of that delicious vegetable, as they were just emerging from the sand and shingle in which they grew. The root of *C. tatarica*, called *Tartar bread*, peeled and sliced, is eaten in Hungary, with oil, vinegar, and salt. *Wild Radish* (*Raphanus raphanistrum*) is very plentiful among corn; it is often mistaken for Charlock, by which name it is not unfrequently called, but from which it is easily distinguished by its white and sometimes purplish flowers. Linnæus attributed a disease with which the common people in Sweden were attacked, to the seed of this plant being ground along with the corn, and then eaten; but there is no reason for supposing that the plant possesses any deleterious properties; on the contrary, it has been shown that it is perfectly harmless, and has been recommended as a nutritious food for domestic animals. The roots of *R. maritimus*, the *Sea-Radish*, are said to be preferable to Horse-radish.

In treating of this great family of the Cruciferae, we have only noticed those tribes which furnish subjects of interest as regards their properties and uses; the others, in which we find no such subjects, we have passed over.

ORDER XIV.—CAPPARIDACEÆ—THE CAPERS.

THESE are either herbaceous or woody plants, sometimes acquiring the habit and stature of trees. The *Leaves* are alternate, very rarely opposite,



Fig. 36. *Capparis Spinosa*.

simple or palmate, without leaflets at their base, but sometimes with spines in the place of them. *Flowers* hermaphrodite, sometimes unisexual, either solitary or arranged in spikes. *Calyx* with four segments, either distinct or more or less united; sometimes with two, and sometimes formed into a two-lobed tube. *Corolla* formed of four, rarely eight unequal petals, arranged opposite each other in the form of a cross, elaved at the base, and inserted on the margin of a receptacle which more or less covers the base of the calyx and the support of the ovary. *Stamens*, four, six, or eight, often indefinite, almost perigynous. *Ovary* simple, free, often raised

upon a more or less elongated support, at the base of which are inserted the petals and stamens. *Style* terminal, often very short. *Fruit*, one-celled, and either one or many-seeded; either fleshy, with numerous seeds in the pulp, as in *Capparis*, or pod-shaped and opening with two valves like the *Cruciferae*, as in *Cleome*. *Seeds* without albumen, containing a spirally-twisted embryo with oily seed-leaves (cotyledons). This family is divided into two tribes.

TRIBE 1. *Cleomeæ*.—Fruit, a capsule opening with two membranous valves. Plants herbaceous or half-shrubby, with compound leaves, usually clothed with glandular down.

GENERA AND SYNONYMES.

<i>Cleomella</i> , DC.	<i>Atalanta</i> , Nutt.	<i>Physostemon</i> , M. & Z.	<i>Cristatella</i> , Nutt.
<i>Gynandropsis</i> , DC.	<i>Peritoma</i> , DC.		<i>Isomeris</i> , Nutt.
<i>Gymnogonia</i> , R.	<i>Roridula</i> , Forsk.	<i>Wislizenia</i> , Englm.	<i>Dipterygium</i> , Dcn.
[Br.]	<i>Rorida</i> , Röm. & S.	<i>Polanisia</i> , Raf.	<i>Pteroloma</i> , Steud.
<i>Cleome</i> , DC.	<i>Dactylena</i> , Schrad.	<i>Cyrbasium</i> , Endl.	[& Hochst.]
<i>Sinapistrum</i> , Mön	<i>Oxystylis</i> , A. Gray.		

TRIBE 2. *Cappareæ*.—Fruit a berry, fleshy and unopening. Trees or shrubs, rarely herbs, with simple or three lobed leaves.

GENERA AND SYNONYMES.

Schepperia, Neck.	Boscia, Lam.	Lindackera, Sieb.	Stephania, W.
Macromerum,	Podoria, Pers.	Breynia, Pl.	Tovaria, R. & P.
[Burch.	Streblocarpus, Arn.	Busbeckia, Endl.	Singana, Aubl.
Atamisque, Miers.	Mærua, Forsk.	Morisonia, Pl.	Sterebeckia, Sch.
Cadaba, Forsk.	Colicodendron, Mrt	Crataeva, L.	Hermupoa, Löffl.
Stromia, Vahl.	Calanthea, DC.	Othrys, Noronb.	Roydsia, Roxb.
Desmocarpus,	? Quadrella, DC.	Ritchiea, R. Br.	Beautempsia, Gaud.
[Wall.	Capparis, L.	Steriphoma, Sp.	Destrugesia, Gaud.
Thylachium, Lour.	Homback, Ad.	Römeria, Tratt.	Belidicta, Karstén.
Nieburhia, DC.	Sodada, Forsk.		

GEOGRAPHICAL DISTRIBUTION.—The individuals of this family are found chiefly between the tropics and in the regions adjoining; the greatest number is in America and Africa, one or two in the south of Europe, and a few in the United States.

PROPERTIES AND USES.—In this family a volatile, acrid, and stimulant principle is found, somewhat analogous to that which is met with in the Cruciferæ.

Of the *Cleomeæ*, *Cleome gigantea* exhibits a strong disagreeable smell and caustic taste. The leaves of *C. heptaphylla* are eaten raw in South America as we do those of mustard, and they are infused in warm water till they are tender, when they furnish a dish equal to boiled lettuce; they are also mixed with other herbs to form what the inhabitants call *atsjana*. This and *C. polygama* have a balsamic odour, and are considered stomachic and vulnerary. The root of *Polanisia icosandra* is used in the United States as a vermifuge; and the plant is eaten by natives of the East Indies among other herbs as a salad for the pungency it communicates.

Capparææ.—The most important plant of the family is *Capparis spinosa*, or *Caper*, Fig. 36, from which the capers of commerce are obtained. The Caper grows abundantly in the south of Europe, along the shores and on the islands of the Mediterranean, and in Syria. It is generally found wild on walls and rocks; it is met with on the walls of Rome, Sienna, and Florence, and is extensively cultivated in the south of Europe, particularly between Marseilles and Toulon, and in many parts of Italy; but it is from Sicily that the greatest supply is brought. The flower-buds form the capers so much used as a pickle and a sauc, but in some parts the fruit is also employed. In the early part of summer the plant begins to flower, and the flowers continue to appear successively till the beginning of winter. The young flower-buds are picked every morning, and as they are gathered they are put into vinegar and salt; and this operation continues for six months, as long as the plants are in a flowering state. When the season closes, the buds are sorted according to their size and colour, the smallest and greenest being the best; these are again put into vinegar, and then packed up for sale and exportation. Capers are stimulant, antiscorbutic, and are much employed as a condiment, but the medicinal virtues of the plant reside in the root, which is slightly bitter, somewhat acrid and sour, and is diuretic.

The Caper is, according to Dr. Royle, the *Hyssop* of Scripture (*esob* or *esof*) "which springeth out of the wall," of which Solomon spoke. It produces long trailing branches of sufficient length to be used as a stick, on which the sponge filled with vinegar was offered to our Saviour when on

the cross. "They filled a sponge with vinegar and put it upon hyssop," says John (chap. xix. verse 29), and this accounts for the seeming discrepancy which some writers fancy they detect between John's and Matthew's account of the crucifixion, because the latter says they "put it on a reed." It is the same plant which was used by the children of Israel to sprinkle the blood on the door-posts at the institution of the Passover.

C. ferruginea is strongly impregnated with an acrid, volatile salt, like the mustards, and hence, in Jamaica, it has obtained the name of the *Mustard Shrub*. *C. sodaba*, according to Dr. Oudeny, produces a small drupe, which is in great request about Bournou and Soudan for removing female sterility. It is sweetish and hot to the taste, approaching to water-cresses; and in passing the plant, a heavy, narcotic smell is always perceived.

The genus *Cratæva* is called *Garlick Pear* from the fruit of *C. Tapia*, which is about the size of an orange, and, when ripe, has a strong scent of garlic, which is communicated to the animals that feed upon it. It is called *Tapia* by the Brazilians, who use the bruised leaves against inflammations, and the bark as a tonic bitter. *C. gynandra* has a nauseous smell and a burning taste, and the bark of the root blisters like cantharides. In Madagascar, *C. excelsa* (called by the natives *Vouën pouën*) attains the dimensions of a tree, from which planks four feet broad are cut. In the Society Islands, *C. religiosa* is planted in burial-grounds, and is supposed to be sacred to their idols. It is called *Pura-au* and *Puratrura* in Otaheite. The fruit of *C. Nurvala* is said to be pleasant to eat.



ORDER XV.—RESEDACEÆ.—THE WELDS.

PLANTS generally herbaceous, rarely shrubby, with entire or divided alternate *Leaves*, without leaflets at their base, but with two glands in the place of them. *Flowers* hermaphrodite, irregular, arranged in the form of simple terminal spikes. *Calyx* with four to seven deep, unequal segments. *Corolla* with four to seven petals, which are alternate with the segments of the calyx, the upper ones cut like a cock's comb, and the lower entire. *Stamens* ten to thirty, inserted on a peculiar receptacle, which is a fleshy, glandular mass, between them and the petals. *Pistil* terminated by three horns, each bearing a stigma on its summit. *Ovary* free, three-lobed, one-celled, many-seeded, and opening at the top before maturity, thus leaving the ovules exposed to the air. *Fruit* a capsule, with a many-seeded cell, open at the top, and terminated by three horns. *Seeds*, kidney-shaped, without albumen, with an embryo bent like a horse's shoe.

Fig. 37. *Reseda mediterranea*, and fruit.

GENERA AND SYNONYMES.

- Ochradenus*, Delil.
- Reseda*, L.
- Luteola*, T.
- Ereseda*, Spach.
- Oligomeris*, Cambess.
- Resedella*, Webb & B.
- Elimia*, Nutt.
- Holopetalum*, Turcz.
- Astrocarpus*, Neck.
- Sesamoides*, T.
- Sesamella*, Rehb.
- Caylusea*, St. Hil.

GEOGRAPHICAL DISTRIBUTION.—These are found, for the most part, in Europe, and on the shores of the Mediterranean. A few are met with in northern India, California, the Cape of Good Hope, and the Canary Isles.

PROPERTIES AND USES.—The most important plant of this family is *Reseda luteola*, commonly called *Weld* or *Dyer's weed*. It grows wild in many parts of Britain, generally on waste ground, in stony places, and among the debris at the foot of rocky hills. It is cultivated to some extent in the neighbourhood of manufacturing towns, for the excellent yellow dye which it furnishes, and which is obtained by simply enclosing the whole plant, either in a dry or green state, in a linen bag, and boiling it in the water in which the articles to be dyed are dipped. It is a valuable dye, as it serves equally for woollen, linen, or silk; dyeing not only a rich yellow,

but also, properly managed, all the different shades of yellow, with brightness and beauty; and, if these be previously dipped blue, they are, by Weld, changed into a very pleasing green. The plant has a bitter taste, and has been employed in medicine as a diaphoretic and diuretic. The colouring property of the plant resides in a principle obtained by Chevreul, by sublimation, which he named *Luteolin*.

Reseda odorata, the "fragrant weed" of the flower-garden, called *Mignonette*, also belongs to this family, and is a native of the north of Africa and Egypt. It was introduced to this country from the Royal Garden at Paris, in 1742, by Lord Bateman, and soon became an established favourite. The name which it now bears, and which signifies "Little Darling," was applied to it on its introduction to France, and was too appropriate to be either rivalled or supplanted; that being the only popular name it has ever borne.

Mignonette, though cultivated as an annual, is in reality a perennial; and if grown in a greenhouse, may be preserved for many years. When so protected it assumes a half shrubby character, and may be trained two feet in height; from this circumstance it has received the name of 'Tree Mignonette,' and been regarded by some as a distinct species, while it is neither more nor less than that which is cultivated as an annual.



ORDER XVI.—BIXACEÆ—THE ANNOTTA FAMILY.

TREES or shrubs, with alternate, simple, entire *Leaves*, frequently marked with transparent dots, sometimes leathery, and without leaflets at their base. *Flowers* hermaphrodite, or often unisexual, and diœcious, regular. *Calyx* with three to seven segments, sometimes united at the base. *Corolla*, in some wanting, when present, the petals equal in number to the segments of the calyx and alternating with them. *Stamens* indefinite, fertile, or, very rarely, sterile. *Ovary* free, sessile, globular, one-celled in all the genera of the family except Flacourtia, in which it has from six to nine cells. *Style* terminal, simple, or parting into many divisions. *Fruit* either a berry and unopening, or a capsule, many-seeded. *Seed* enclosed in a coloured, withered, pulposus integument. *Albumen* fleshy, somewhat oily. *Embryo* straight in the axis, with the radicle turned to the hilum. This family is divided into the following four tribes.

Fig. 38. *Bixa orellana*. A, the fruit.

TRIBE 1. *Bixææ*.—Style simple. Fruit opening.

GENERA AND SYNONYMES.

<i>Bixa</i> , L.	<i>Trochospermum</i> , Bl.	<i>Xylothecca</i> , Hochst.	,, <i>Leucocarpon</i> , A.R.
<i>Echinocarpus</i> , Bl.	<i>Lindackeria</i> , Bl.	<i>Denhamia</i> , Meisn.	

TRIBE 2. *Prockææ*.—Style simple. Fruit unopening.

GENERA AND SYNONYMES.

<i>Carpotroche</i> , Endl.	<i>Eriudaphus</i> , Nees	<i>Lightfootia</i> , Sw.	<i>Bosea</i> , Fl. Fl.
<i>Mayna</i> , Radd.	<i>Dasyanthera</i> , Prl.	<i>Aphloia</i> , Benn.	<i>Xyladenus</i> , Desv.
<i>Onocoba</i> , Forsk.	<i>Ludia</i> , Lam.	<i>Newmannia</i> , A.R.	<i>Azara</i> , R. & Pav.
<i>Lundia</i> , Thonn.	<i>Lætia</i> , Lœffl.	<i>Xylothecca</i> , Hochst.	<i>Kuhlia</i> , H.B.K.
<i>Phoberos</i> , Lour.	<i>Thamnia</i> , P. Br.	<i>Asera</i> , Schott.	<i>Lilenia</i> , Bert.
<i>Rhenanthera</i> , Bl.	<i>Hellwingia</i> , Ad.	<i>Trilix</i> , L.	<i>Almeja</i> , Endl.
<i>Lemonia</i> , Gert.	<i>Prockia</i> , P. Br.	<i>Zuelania</i> , A.R.	<i>Pineda</i> , R. & Pav.
<i>Scolopia</i> , Schreb.	<i>Thiodia</i> , Ben t.	<i>Banara</i> , Aub.	<i>Christannia</i> , Prl.

TRIBE 3. Flacourteæ.—Styles or stigma several. Fruit a berry and unopening.

GENERA AND SYNONYMES.

Flacourtia, <i>Com.</i>	Roumea, <i>Poit.</i>	Limacia, <i>Dietr.</i>	Myroloxylon,
Stigmarota, <i>Lour.</i>	Koelera, <i>W.</i>	Hisingera, <i>Hell.</i>	[<i>J.R.F.</i>]
Rhamnopsis, <i>Rech.</i>	Bessera, <i>Sp.</i>	Xylosma, <i>G. Forst.</i>	Lunania, <i>Hook.</i>

TRIBE 4. Erythrospermeæ.—Styles several. Fruit unopening.

GENERA AND SYNONYMES.

Kigellaria, <i>L.</i>	Erythrospermum,	Tachibota, <i>Aub.</i>	Aberia, <i>Hochst.</i>
Monospora, <i>Hochst.</i>	[<i>Lam.</i>]	Salmasia, <i>Schreb.</i>	Dovyalis, <i>E. Meyer.</i>

GEOGRAPHICAL DISTRIBUTION.—These are distributed throughout the tropical and hot regions of both hemispheres. Some are found in Mauritius and at the Cape of Good Hope; and one or two in New Zealand.

PROPERTIES AND USES.—The Bixæ furnish us with the *Annotta* of commerce, which is a red dyeing drug, produced from the red pulp which covers the seeds of *Bixa orellana*, Fig. 38, a shrub growing spontaneously in South America, and cultivated in the West Indies. The fruit is like a chestnut, a two-valved capsule covered with flexible bristles, and contains a certain number of seeds smaller than peas. These seeds are covered with a soft, viscous, resinous pulp, of a beautiful vermilion colour and unpleasant smell, like red lead mixed with oil; and it is this matter which constitutes *Annotta*. The mode in which it is obtained is by pouring hot water over the pulp and the seeds, and leaving them to macerate until they are separated by pounding them with a wooden pestle. The seeds are then removed by straining the mass through a sieve; and the pulp being allowed to settle, the water is gently poured off, and the pulp put into shallow vessels, in which it is gradually dried in the shade. After acquiring a proper consistency, it is made into cylindrical rolls, or balls, and placed in an airy place to dry, after which it is sent to market. This is most common in the English market, and is in the form of small rolls, each two or three ounces in weight, hard, dry, and compact; brownish without and red within. The other process of manufacture is that pursued in Cayenne. The pulp and seeds together are bruised in wooden vessels, and hot water poured over them; they are then left to soak for several days, and afterwards passed through a close sieve to separate the seeds. The matter is then left to ferment for about a week, when the water is gently poured off, and the solid part left to dry in the shade. When it has acquired the consistency of a solid paste, it is formed into cakes of three or four pounds weight, which are wrapped in the leaves of *Arundo* or *Banana*. This variety is of a bright yellow colour, rather soft to the touch, and of considerable solidity.

Labat informs us that the Indians prepare an *Annotta* greatly superior to that which is brought to us, of a bright shining red colour, almost equal to carmine. For this purpose, instead of steeping and fermenting the seeds in water, they rub them with the hands, previously dipped in oil, till the pulp comes off and is reduced to a clear paste, which is scraped off from the hands with a knife, and laid on a clean leaf in the shade to dry. Mixed with lemon juice and gum, it makes the crimson paint with which Indians adorn their bodies; and they employ the leaves and roots in cookery to increase the flavour and give a saffron colour.

Annotta is principally consumed by painters and dyers. It dyes cotton and silks of a beautiful orange yellow colour, fixed by acetic or citric acid, but it is unfortunately very fleeting. It is not readily acted upon by water, and merely tinges the liquor of a pale brownish yellow colour. In rectified spirit of wine it very readily dissolves, and communicates a high orange or yellowish red; hence it has been used as an ingredient in varnishes, for giving more or less of an orange colour to the simple yellows. Its colour is not changed by alum or by acids, any more than by alkalies, but when imbedded in cloth, it is discharged by soap and by exposure to the air. It is also used in Cheshire, Gloucestershire, and North Wilts, to colour cheese with the pale yellow or flesh colour, which distinguishes that which is made in these districts, the makers in Cheshire using eight dwts. to sixty lbs. of cheese; while those of Gloucestershire use one ounce to one cwt.—quantities which are too small to affect the cheese in any way except in colour. The Dutch use it for heightening the colour of their butter.

Annotta contains a peculiar crystallizable colouring principle, to which M. Preisser, its discoverer, gave the name of *Bixin*. The bark of the tree yields a fibre which makes good ropes for common plantation uses in the West Indies; and pieces of the wood are used by the Indians to procure fire by friction.

The *Prockææ* embrace a number of trees which furnish excellent timber. *Phoberos Mundtii*, or *Klipdoorn* of the Dutch settlers at the Cape of Good Hope, is found in the aboriginal forests of Tzitsikamma, and sparingly on the east side of Table Mountain. It reaches a height of twenty or thirty feet, and a diameter of three feet or more; and the wood is close, hard, and highly useful for builders, and especially for waggon makers. *P. Ecklonii* is plentiful in the thickets of Victoria district, and is called *Roodpeer*. It attains nearly the same dimensions as the preceding; the wood is hard, heavy, and close, takes a fine polish, somewhat resembling mahogany, and answers well for all kinds of furniture. In the colony it is mostly used by wheelwrights for fellies, axles, and spokes, and is well adapted for the construction of mills. The wood of *Latia guidonia*, called *Rod-wood* in Jamaica, is used for all kinds of buildings; and *L. apetala*, a native of Brazil and other tropical parts of America, has a flower like that of the hawthorn, and secretes a balsamic resin, which becomes white in contact with the air, like Sandarach. The pulp of *Oncoba* is sweet, and eaten in Nubia.

Flacourteæ.—Most of the species of the genus *Flacourtia* produce fruit which is eatable. *F. Rumoutshi*, a native of Madagasear, has fruit of the size and shape of a small plum; red when ripe, but at length becoming violet-coloured, with a transparent red flesh. The natives eat the fruit, which are sweet, but leave a sharpness in the mouth. The fruit of *F. sapida*, *F. inermis*, and *F. sepiaria* are eatable and wholesome, and some of them are much esteemed, particularly *F. inermis*, which is cultivated extensively in the Moluccas; and *F. sapida*, the size of the common currant, is eaten by the natives, and called *Pedda Canrew*. Of this last, according to Wight, an infusion is considered useful in bites of snakes; and the bark rubbed with oil, and made into a liniment, is employed against gout on the Malabar coast. The young shoots and leaves of *F. cataphracta* are prescribed in the Circars in cases of diarrhœa and general debility, being considered astringent and stomachic, and possessing the taste of Rhubarb.

ORDER XVII.—CISTACEÆ—THE ROCK-ROSES.

THIS family is composed of annual and perennial herbaceous plants and small shrubs, some of which contain a resinous juice. The *Branches* are often gummy. The *Leaves* opposite, rarely alternate, simple, entire, sometimes furnished with stipules.

Flowers hermaphrodite, almost regular; white, yellow, or red, and lasting for a very short time. *Calyx* permanent, with three to five segments, arranged in two series, the two exterior generally the smaller. *Corolla* with five petals, rarely three. *Stamens* indefinite in number, distinct; anthers two-celled, opening longitudinally. *Ovary* free, globular, rarely one-celled, more generally with five or ten cells, containing several ovules, inserted at the inner edge of the partition. *Style* and *stigma* simple. *Fruit* a globular capsule, enclosed in the calyx, which is per-



Fig. 39. *Cistus symphytifolius*.

manent, three to five, or even ten-celled, and opening by three, five, or ten valves, each bearing one of the partitions. *Seeds* numerous in each cell, and containing an embryo which is more or less curved or spirally twisted in a thin mealy or somewhat horny albumen, Fig. A.

GENERA AND SYNONYMES.

Fumana, Spach.
Cistus, T.
Helianthemum, T.
Aphananthemum, Spach.
Rhodax, Spach.
Argyrolepis, Spach.

Crocanthemum, Spach.
Heteromeris, Spach.
Trichasterophyllum, W.
Lechea, L.
Lechidium, Spach.

Hudsonia, L.
Tæniostoma, Spach.
Cochlospermum, Kunth.
Wittelsbachia, Mart.
Maximiliana, Schk.

GEOGRAPHICAL DISTRIBUTION.—The great mass of this family is found on the African shores of the Mediterranean and throughout Europe; very few in America, and scarcely any at all in Asia.

PROPERTIES AND USES.—The product furnished by the plants of this family demanding the most special attention is a resinous substance known in commerce by the name of *Labdanum*. It is obtained from the leaves of *Cistus Ladaniferus*, *C. laurifolius*, *C. Ledon* and *C. creticus*. The first is well known in the gardens of this country as *Gum Cistus*. Upon the leaves

and branches of these shrubs a juice exudes which is collected by means of an instrument made with leather straps united together and arranged like the teeth of a comb, and these are drawn over the plant. The juice adheres to the pieces of leather and is afterwards separated by scraping with a knife. Formerly, according to Guibourt, it was gathered from the beards of the goats, whereon it collected while the animals browsed on the plant. Two varieties of Labdanum exist in commerce; one, called the *purest Labdanum*, is very rare, and is distinguished by being of a dark red, almost black colour externally, greyish internally; when first broken, of the consistence of a plaster, softening in the hand and becoming adhesive; of an agreeable balsamic odour like that of amber, and of a bitter, balsamic, somewhat acrid taste. It is very inflammable, burning with a clear flame. On exposure it becomes dry, porous, and brittle, from the evaporation of the water it contains. *Common Labdanum* is in pieces of a contorted or spiral form, light, porous, blackish-grey, hard and brittle; not softening between the fingers; similar in odour and taste to the preceding variety, but less inflammable, and mixed with much sand, and other earthy matter, which can easily be detected by the naked eye. Guibourt says he has seen two varieties of Labdanum received from Holland; one slightly resinous, but not containing an atom of Labdanum, and in fact nothing more than a mixture of common resin, ashes, or sand; the other, in which the smell indicated a small quantity of Labdanum, and so mixed with earth that it was reduced to powder in the fingers, and smoked with difficulty when thrown on burning coals. Labdanum is a stimulant expectorant, and was formerly given in catarrhal and dysenteric affections. At present it is only used in plasters and sometimes for fumigation. It is frequently employed by perfumers in the preparation of cosmetics; and sometimes it is used as an ingredient in ointments.

Helianthemum canadense has of late years been employed in America for its tonic and astringent properties, and has been found highly successful in cases of scrofula and diarrhoea, as a gargle in scarlatina and a wash in prurigo.

Dr. Royle says that *Gum Kutera*, which in the north-western provinces of India is substituted for Tragacanth, is obtained from the trunk of *Cochlospermum gossypium*; but according to Th. Martius it is produced by *Acacia leucophloea*, Roxb. M. Virey thinks it is produced by a *Mesembryanthemum*, while MM. Desvaux and Damart are of opinion that it is obtained from a species of Cactus. We are, however, inclined to the opinion of Dr. Royle. A decoction of the roots of *C. insigne* is employed in Brazil for internal pains, especially those arising from falls or accidents, and also to heal abscesses. It is called *Butua do curvo*. *C. tinctorum* furnishes a yellow dye.

ORDER XVIII.—VIOLACEÆ—THE VIOLETS.

ANNUAL or perennial herbaceous plants, or shrubs, with alternate, rarely opposite, simple *Leaves*, furnished with permanent leaflets at their base. *Flowers* hermaphrodite, regular or irregular, solitary. *Calyx* with five segments, imbricate in æstivation (Fig. 11), generally distinct, but sometimes slightly united at their base, which is in some cases continued beneath the point of insertion. *Corolla* with five unequal petals, of which the lower is prolonged at its base into a more or less elongated spur; very rarely is the corolla of five regular petals. *Stamens* five, with the anthers united, surrounding the ovary, and terminated by a membranous continuation of the filaments; the two which are situated towards the lower

Fig. 40. *Viola odorata*.

petal frequently present an appendage in the form of a recurved horn, which rises from their back and is prolonged into a spur, Fig. c. *Ovary* free, one-celled, with many ovules, attached to three partitions. *Style* simple, a little jointed at the base, enlarged towards its upper part, which is terminated by a lateral stigma, presenting a small semicircular pit. *Fruit* a capsule, many-seeded, opening in three valves, Fig. A. *Seeds* indefinite in number, with a straight embryo in a thick fleshy albumen, Fig. B.

TRIBE 1. *Violææ*.—Flowers irregular, rarely almost regular; petals with long claws.

GENERA AND SYNONYMES.

<i>Viola</i> , <i>L.</i>	<i>Ilybanthus</i> , <i>Jacq.</i>	<i>Anchieten</i> , <i>St. H.</i>	<i>Calyptrium</i> , <i>Ging.</i>
<i>Erpetion</i> , <i>DC.</i>	<i>Solea</i> , <i>Sp.</i>	<i>Noisettia</i> , <i>M. & Z.</i>	<i>Amphirrhox</i> , <i>Sp.</i>
<i>Mnemion</i> , <i>Spach.</i>	<i>Pigea</i> , <i>DC.</i>	<i>Schweiggeria</i> , <i>Sp.</i>	<i>Amphirrhoge</i> ,
<i>Cittaronium</i> , <i>Rechb.</i>	<i>Noisettia</i> , <i>Kunth.</i>	<i>Glossarrhen</i> , <i>M.</i>	[<i>Rechb.</i>
<i>Ionidium</i> , <i>Vent.</i>	<i>Bigelovia</i> , <i>DC.</i>	[<i>S. Z.</i>	<i>Spathularia</i> , <i>St. H.</i>
<i>Pombalia</i> , <i>Vaud.</i>	<i>Violæoides</i> , <i>Mæ.</i>	<i>Corynostylis</i> , <i>M. & Z.</i>	<i>Bradleia</i> , <i>Fl. Fl.</i>
<i>Calcicolar</i> , <i>Læfjl.</i>			

TRIBE 2. *Alsodææ*. — Flowers regular; petals very short-clawed, obliquely overlapping each other at the base.

GENERA AND SYNONYMES.

Alsodeia, <i>Thouars.</i>	„ Riana, <i>Aub.</i>	Tetrathylacium,	Neckia, <i>Krthls.</i>
Alsodeia, <i>M. & Z.</i>	Passoura, <i>Aub.</i>	[<i>Pöpp.</i>	Melicytus, <i>Forst.</i>
Conohoria, <i>Kuth.</i>	Rinorea, <i>Aub.</i>	Pentaloba, <i>Lour.</i>	Leonina, <i>R. & P.</i>
Diprax, <i>Nor.</i>	Ceranthera, <i>Palis</i>	? Vareca, <i>Roxb.</i>	Steudelia, <i>Mart.</i>
Physiphora, <i>Sol.</i>	Passalia, <i>Sol.</i>	Hymenanthera, <i>R.</i>	Papayrola, <i>Aub.</i>
Conohoria, <i>Aub.</i>	? Prosthesis, <i>Bl.</i>	[<i>Br.</i>	Periclistia, <i>Benth</i>

GEOGRAPHICAL DISTRIBUTION.—These are found throughout Europe, Siberia, and North America, where they are almost invariably herbaceous. Very few are met with between the tropics, but they are abundant in South America, where they assume the habit of shrubs. A few are met with in Africa, and one only in China.

PROPERTIES AND USES.—The flowers of the sweet-scented Violet are remarkable for the fine perfume which they exhale, and the mucilage which they contain; but it is in the roots of the Violets that any virtues reside. Almost all, and particularly the perennial species, have an acrid and nauseous taste, and possess a more or less intense emetic property.

The *Violeæ* possess these properties in a very eminent degree. The flowers of the *Sweet-scented Violet* (*Viola odorata*), Fig. 40, are noted for their beautiful colour and delightful fragrance, to the effects of which some have absurdly attributed the most frightful results—such as convulsions, apoplexy, and even death; an absurdity, we need not say, upon whatever foundation it may be based, which no one in the present day could possibly entertain. That they sometimes induce faintness and giddiness there cannot be a doubt; but such effects depend much on the state of the constitution at the time, and may be caused as readily by the fragrance of any other flowers. We know that we can support, and even enjoy, the odours of certain flowers, at one time, while at others we regard them with aversion and loathing, when the bodily health is weakened or impaired. The flowers also contain a slightly bitter principle, which is extracted by infusion, and sometimes administered in that form or the distilled water, as anti-spasmodic and slightly soothing in many nervous affections; but it is chiefly as an emollient, on account of the mucilage which they contain, that the infusion of the flowers is administered in cases of inflammation of the respiratory organs. A syrup made of the flowers is employed as an addition to demulcent drinks, and as a laxative for infants. The violet colour extracted by infusion affords the very delicate test called *Violet paper*, used by chemists for acids and alkalis—being reddened by the former, and rendered green by the latter. The fragrance of the flowers is destroyed by drying, and the preservation of their fine colour depends upon the care employed in gathering and drying them. The best way is to gather them before they are fully expanded, spread them out in thin layers in a heated room; or by exposing them to a current of very dry air; and when dry, to preserve them in glass vessels, from which the air is effectually excluded. They are used by confectioners for making confections, candies, syrups, and other articles of a similar description; and by perfumers for scenting oils, pomades, and making *Eau des Violettes*. The root, or rather the underground stem, has a strong smell, particularly when dried; and its taste is acrid, bitter, and nauseous. When taken internally, in a dose of from thirty grains to a drachm, it acts as an emetic and cathartic. The seeds are sometimes prescribed as a purgative.

From the root, stems, and leaves of the Sweet-scented Violet, *M. Boullay* extracted an alkaline principle which he called *Violine*. It is bitter, acrid, active, and even poisonous; of a white colour, soluble in alcohol, but scarcely soluble in water, and forms salts with the acids. It exists in the plant combined with malic acid, and may be obtained by treating with distilled water, the alcoholic extract of the dried root, decomposing, by means of magnesia, the malate of viola contained in the solution, and extracting the alkali from the precipitated matters by alcohol, which yields it on evaporation. A double variety of this species is forced for its flowers, which are sold extensively, early in the spring, for making bouquets; and another double variety, with pale flowers, is also forced for the same purpose, and is known by the name of *Neapolitan Violet*.

Viola tricolor, called *Heartsease* or *Pansy*, and, in the days of superstition, *Herb Trinity*, has been said to possess considerable medicinal properties. All the parts of the plant have a bitter disagreeable flavour, and, when bruised, exhale a smell resembling peach kernels. Some authors have considered it efficacious in chronic diseases of the skin; but for that, and for several other purposes to which it has been applied, it is doubtful if it is of any service. Its root is feebly emetic. *V. pedata*, an American species, is considered a useful expectorant and demulcent in pectoral complaints.

Different species of *Ionidium* possess the properties of ipecacuanha, and are used in the countries of which they are natives as substitutes for that drug. *I. ipecacuanha* is a native of Brazil, and was, for a long time, believed to be the plant which produced the genuine drug of that name; but it is now known that it is furnished by a totally different plant, belonging to the order Rubiaceæ. This is generally called the *White Ipecacuanha*; the root is almost insipid and inodorous, and, according to Guibourt, contains no starch, and it is doubtful that it possesses any well-defined properties; while, according to the analysis of Richard, it contains more than half its weight of starch, a little emetine, some salts, and other matters. It is used in Brazil as an emetic. The root of a species growing in Quito has attracted some attention, as a remedy in elephantiasis, under the native name of *Chnichunchulli*. The plant being considered an undescribed species by Dr. Bancroft, was named by him *I. murcucci*, but Sir William Hooker found it to be identical with *I. parviflorum*. It grows in the neighbourhood of Riombaba, a small town at the foot of the great mountain Chimborazo. It is said to be diaphoretic, diuretic, and, in large doses, emetic and cathartic. *I. ituba* is a native of Guiana and Brazil, and is there known by the name of *Itoubou*. Some of the inhabitants of Rio-Grande-do-Norte assured M. St. Hilaire that they can radically cure the gout with a decoction of the roots. The roots are white within, and greyish and reddish without, and are sold by the inhabitants of Brazil under the name of *Poaya da praia*, or *Poaya branca*. *Anchietea salutaris* has the smell of cabbage, and a nauseous taste; the Brazilians use it as a purgative, and esteem it as a remedy in diseases of the skin. The foliage of *Conohoria lobolobo*, when boiled, becomes mucilaginous, and is used in Brazil in the same way as we do spinach.

ORDER XIX.—DROSERACEÆ—THE SUN-DEWS.

HERBACEOUS perennials, rarely half shrubby, plants constitute this interesting family. *Leaves* all proceeding from the root, arranged in the form of a rosette; simple, fringed round the margin with pedicellate glands which secrete a mucilaginous substance, having the appearance of drops of dew, and hence the name of the family; before they expand they are rolled up in a coil like the spring of a watch. *Flowers* hermaphrodite, regular. *Calyx* with five segments, united at their base, imbricate before opening (Fig. 11). *Corolla* with five flat and regular petals. *Stamens* five, sometimes ten, free, and alternate with the petals. *Ovary* single, one-celled, many-ovuled, Fig. A. *Styles* three to five; or four almost sessile *Stigmas*. *Fruit* a capsule, many-seeded, opening by its upper half only, in three, four, or five valves. The *Seeds*, which are often covered with a loose tissue, contain an

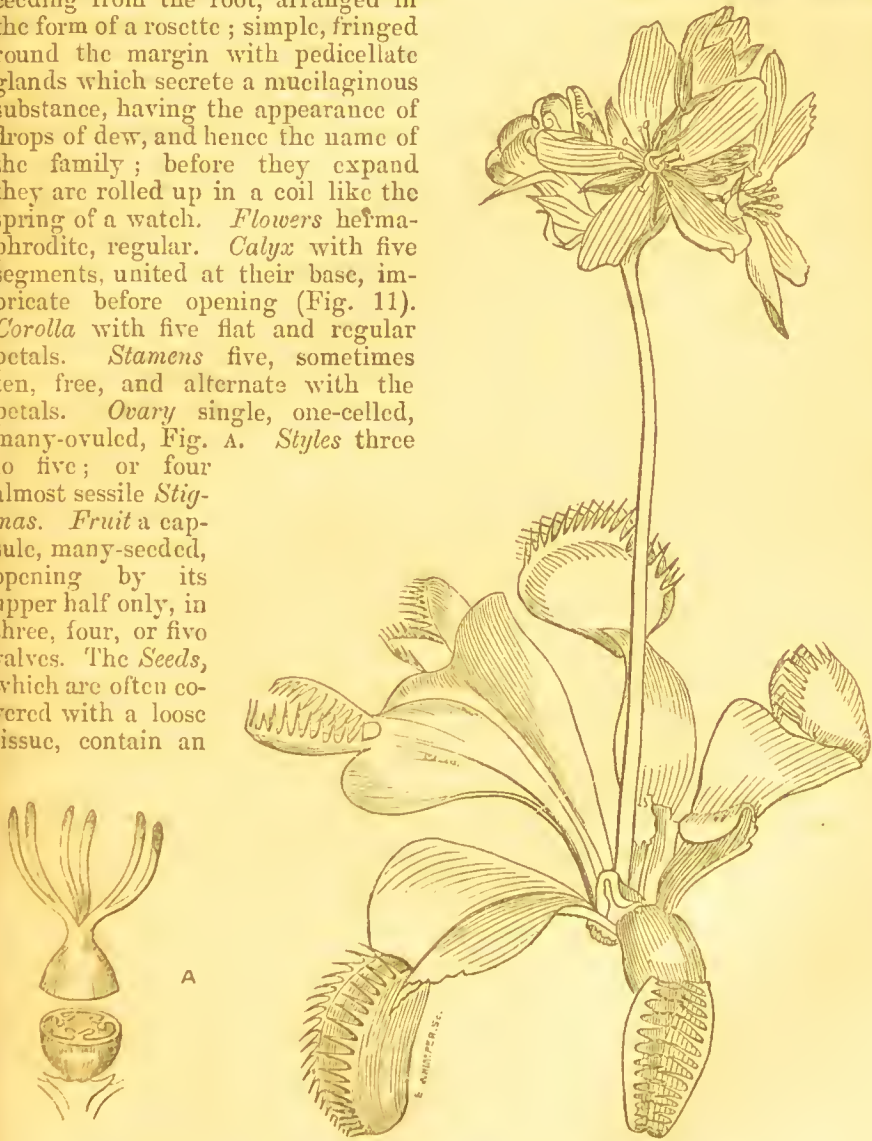


Fig. 41. *Dionaea muscipula*. A, Ovary of *Drosera filiformis*.

erect nearly cylindrical *Embryo*, in the base of a thin fleshy *Albumen*.

 GENERA AND SYNONYMES.

Drosera, <i>L.</i>	Esera, <i>Neck.</i>	Drosophyllum, <i>Luk.</i>	Iridion, <i>Burm.</i>
Rorella, <i>Rupp</i>	Aldrovanda, <i>Monti.</i>	Dionæa, <i>Ellis.</i>	Sondero, <i>Lehm.</i>
Ros Solis, <i>T.</i>	Byblis, <i>Salisb.</i>	Roridula, <i>L.</i>	

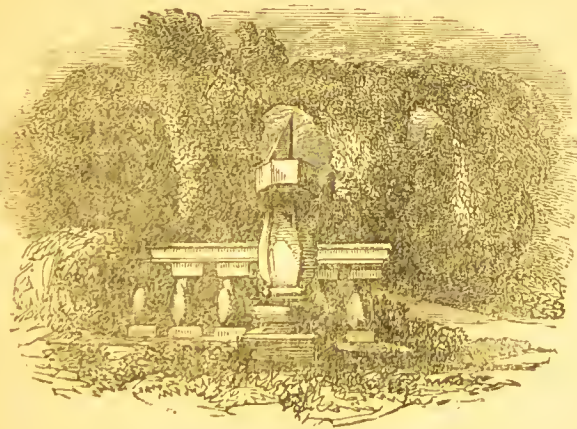
GEOGRAPHICAL DISTRIBUTION.—These are inhabitants of bogs, marshes, and inundated grounds in New Holland, North and South America, and the Cape of Good Hope, India, and China. Few are found in Europe.

PROPERTIES AND USES.—This family is composed of plants remarkable for the singularity of their leaves, and the wonderful powers which they possess. *Venus' Fly-Trap* (*Dionæa muscipula*), Fig. 41, from the nature of its leaves, would almost lead one to imagine that Providence had so designed them as to serve for a machine to catch food. These leaves are composed of two lobes, furnished on their margins with long bristly hairs, and on their inner surface with about three erect highly irritable bristles, from which it is supposed a sweet liquor is discharged, and this forms the bait. When an insect, attracted by the sweet bait, alights on the leaf, that instant these tender bristles are irritated by its feet, the two lobes rise up, grasp it fast, lock the two rows of bristles together like the teeth of a rat-trap, and squeeze the little captive to death. Should it, however, remain quiet, the lobes will gradually re-open, and it will regain its liberty; but the greater agitation it makes, the more certain will its death be. Sir J. E. Smith thinks that the bodies of insects so entrapped, contribute, in decay, an air wholesome to the plant. The plant, however, cannot distinguish an animal from a general substance; for if we introduce a straw or a pin between the lobes, it will grasp it fully as fast as if it were an insect. The Fly-Trap grows naturally in the swamps of North Carolina; and is generally grown in this country in the coolest situation of a stove, near the glass. It has been found that the leaves, if placed in damp moss, will take root and produce young plants on their margins.

The *Sun-Deus* (*Drosera*) are a beautiful and interesting genus, some of which may be found growing in our own native bogs; the leaves, which are circular, are fringed with hairs, discharging from their ends small drops or globules of a pellucid, viscid, acrid liquor, like dew, which continue even in the hottest part of the day, and in the fullest exposure to the sun.

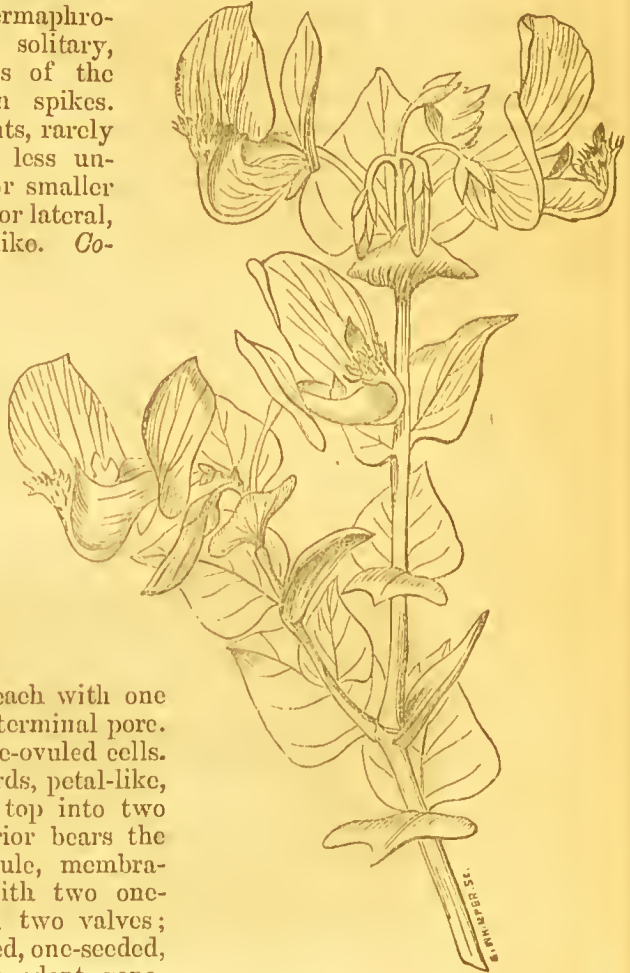
D. lunata, a native of Nepaul, is said to possess the same irritability in the leaves as *Dionæa*, and to entrap insects which alight on them. The same property has been attributed to the *Common Sun-Dew* (*D. rotundifolia*) so plentiful in our bogs. Dr. Withering relates an instance of this from a correspondent, who states: "In August, 1780, examining the *Drosera* in company with Mr. Whately, on his inspecting some of the contracted leaves, we observed a small insect or fly very closely imprisoned therein. On Mr. Whately centrically pressing with a pin other leaves, yet in their natural and expanded form, we observed a remarkable, sudden, and elastic spring of the leaves, so as to become inverted upwards, and, as it were, encircling the pin, which evidently showed the method by which the fly came into its embarrassed situation." The whole of this plant is acrid, and sufficiently caustic to erode the skin; but some ladies know how to mix the juice with milk, so as to make it an innocent and safe application to remove freckles and sun-burns. The juice which exudes from it undiluted will destroy warts

and corns. Formerly there was an agreeable liqueur, called *Ros Solis*, made by infusing four handfuls of the plant in two quarts of brandy, and adding a pound and a half of finely powdered sugar, a pint and a half of milk-water, an ounce of powdered cinnamon, and then, after straining it through a cloth, adding two grains of musk and half-an-ounce of sugar-candy. The plant has the same effect upon milk which the Butterwort has, and like that, too, is supposed to induce the rot in sheep, to which *D. communis*, a native of Brazil, is also said to be poisonous. The Sun-dews of the Swan River colony yield a dyeing principle. *D. gigantea* stains paper of a brilliant deep purple, and treated with ammonia it furnishes a clear yellow. *D. erythorhiza* and *stolonifera* have similar dyeing properties. We are informed by Thunberg that *Roridula dentata*, which grows in the mountains of Caffraria, is there placed in houses for the purpose of catching flies, the leaves being covered with fine hairs and a tough glutinous substance to which small insects adhere.



ORDER XX.—POLYGALACEÆ—MILKWORTS.

HERBACEOUS or shrubby plants, some of which are climbers. *Leaves* simple and entire, alternate or opposite, and without leaflets at their base. *Flowers* hermaphrodite, irregular, either solitary, issuing from the axils of the leaves, or arranged in spikes. *Calyx* with five segments, rarely three or two, more or less unequal; the three exterior smaller and green, the two interior lateral, very large, and petal-like. *Corolla* with three or five petals, united longitudinally with the filaments of the stamens into a tube split on one side throughout the whole of its length; the inferior petal is the largest, and concave, forming a keel, which encloses the sexual organs. *Stamens* eight, united by their filaments, with the anthers disposed in two bundles, each with one cell, opening by a wide terminal pore. *Ovary* free, with two one-ovuled cells. *Style* often bent backwards, petal-like, tubular, divided at the top into two lips, of which the inferior bears the *Stigma*. *Fruit* a capsule, membranaceous, compressed, with two one-seeded cells, opening in two valves; or like a cherry, one-celled, one-seeded, and unopening. *Seeds* pendent, generally accompanied by a kind of lobed caruncle, sometimes with a tuft of hair in which it is partly enveloped; with an abundant fleshy *Albumen* containing a straight or slightly curved *Embryo* with the radicle next the hilum.

Fig. 42. *Polygala latifolia*.

GENERA AND SYNONYMES.

Salomonina, <i>Lour.</i>	Badiera, <i>DC.</i>	Muraltia, <i>Neck.</i>	Vascoa, <i>DC.</i>
Polygala, <i>L.</i>	Penæa, <i>Plum.</i>	Heisteria, <i>Lerg.</i>	Monnina, <i>R. & P.</i>
Triclisperma, <i>Raf.</i>	Comesperma, <i>Lab.</i>	Mundia, <i>Kunth.</i>	Hebeandra, <i>Bonp.</i>
Brachytropis, <i>DC.</i>	Catocoma, <i>Bth.</i>	Nylandtia, <i>Dum.</i>	Carpolobia, <i>G. Don.</i>

Lophostylis, <i>Hochst.</i>	Soulamea, <i>Lam.</i>	Trigonia, <i>Aubl.</i>	Acosta, <i>R. & P.</i>
Securidaca, <i>L.</i>	Cardiocarpus,	Mainea, <i>Fl. Fl.</i>	Bredemeyera, <i>W.</i>
Krameria, <i>Læfl.</i>	[<i>Rnw.</i>	Moutabea, <i>Aubl.</i>	Hymenanthera, <i>R.</i>
Xanthophyllum, <i>Rx</i>	Cardiophora,	Cryptostomum,	[<i>Br.</i>
Jackia, <i>Blume.</i>	[<i>Benth.</i>	[<i>Schreb.</i>	Purdiea, <i>Planchon.</i>

GEOGRAPHICAL DISTRIBUTION.—This family is pretty well distributed over the surface of the globe, although in some parts the species are much fewer than in others. They are not unfrequent in the northern hemisphere and in tropical America, but more rare in South America, beyond the tropics, and in the cooler parts of Asia. A few are met with at the Cape of Good Hope.

PROPERTIES AND USES.—With the exception of the genus *Polygala*, all the plants belonging to this family are exotics, and in general exhibit considerable uniformity in their properties, and their mode of action on the different organs to which they may be medically applied. In fact they supply drugs which belong to the class of tonics; some of which, like *Polygala*, are bitter and slightly acrid, while others, like *Krameria*, are exceedingly astringent.

The *Common Milkwort* (*Polygala vulgaris*), so common in our pastures and heaths, possesses the properties of some of the exotic species, though in an inferior degree. Withering states that an infusion of the herb, which is very bitter, taken in the morning fasting, about a quarter of a pint daily, promotes expectoration, and is good for a catarrhus cough. All the parts of *P. amara* (Bitter Milkwort), a native of the continent of Europe, but particularly the root, are intensely bitter. It is a tonic medicine, which at the same time provokes purging, and is frequently used as a substitute for Snake-root, than which, however, it abounds more in balsamic resin. It is employed in pleurisy, malignant and milk fevers, and in pulmonary consumption. A drachm of the root in powder is given as a dose, or an ounce of it is boiled in a pint and a half of water till it is reduced to one pint and drunk with milk. Closely analogous to the virtues of this plant are those of *P. rubella*, a native of the United States. It has a strong and permanent bitter taste, which it yields to water and alcohol. In small doses it is tonic, in larger laxative and diaphoretic. The infusion of the dried plant has been employed to impart a tone to the digestive organs. The root of *P. poaya* is used in Brazil as an emetic, in the same way as ipecacuanha and *P. paniculata*, a native of the same country, possesses a mild, attenuant and sudorific property, and may be administered in infusions and decoctions.

One of the most important species of the family is *P. senega*, a native of all parts of the United States, and called *Snake-Root*. It is a stimulating expectorant, and diuretic, and in large doses proves emetic and cathartic; and although it excites all the secretions, yet its action is more directly on the lungs, and its expectorant virtues are those for which it is chiefly employed. It is in the root where the virtue resides. This is tapering, branched, and variously twisted; about half an inch thick, covered with an ash-coloured, cracked bark, which is hard and resinous, and contains the active principle. The smell is strong in the fresh root, but faint in the dry; the taste is at first sweetish and mucilaginous, a little acrid, bitter, and irritant. Introduced to the mouth, it increases the secretion of the salivary glands. In America the fresh root has a great reputation in the treatment of the

bites of poisonous serpents. It was introduced to medical practice above a century ago by Dr. Tennant, of Virginia, who, having discovered that it was employed both internally and externally by the Senegaro Indians against the bite of the rattlesnake, reasoned from the effects of the poison and the means of removing them, that it might be used advantageously in various diseases of the chest. It is peculiarly useful in chronic catarrh, humoral asthma; the secondary stages of croup, chronic rheumatism, and some kinds of dropsy. The dose of the powdered root is from ten to twenty grains, but it is more frequently administered in decoction. The chemical constituents of Snake-root, are:—1. a peculiar acrid principle, supposed to be an acid, and called *polygalic acid*; 2. a yellow colouring matter of a bitter taste, insoluble or nearly so in water, but soluble in ether and alcohol; 3. a volatile principle considered by some as an essential oil, but thought by Quevenne to possess acid properties, and by him named *virgineic acid*; 4. pectic acid or pectin; 5. tannic acid of the variety which precipitates iron green; 6. gum; 7. albumen; 8. cerin; 9. fixed oil; 10. woody fibre; 11. saline and earthy substances, as the carbonates, sulphates, and phosphates of lime and potassa, chloride of potassium, alumina, magnesia, silica, and iron. But it is chiefly, if not exclusively, in the polygalic acid that the active principle resides which distinguishes this plant. *Polygalic Acid* is a white powder, inodorous, and of a taste at first slight, but soon becoming pungent and acrid, and producing a very painful sensation in the throat. Its composition is carbon, hydrogen, and oxygen; and when given to dogs occasions vomiting and embarrassed respiration, while large doses causes death. After death, dissection reveals inflammation of the lungs, frothy mucus in the stomach, gullet, and superior portion of the wind-pipe, showing the tendency of this substance to increase the mucous secretion, and explaining, in part, the beneficial influence of Seneka in croup. *P. venenosa*, a native of Java, is so poisonous that it is dreaded by the natives, who say that its heavy noxious odour, or even the touch, produces violent sneezing and severe headache. *P. tinctoria*, found on the hills of Arabia, furnishes a blue dye like indigo.

Badiera diversifolia, common in the woods of Jamaica, is called *Bastard Lignum Vitæ*, because it tastes not unlike the gum of guaiacum, which is *Lignum Vitæ*, and is sometimes used for the same purposes. *Soulamia amara* is very bitter, and is used as a strengthening medicine in the Moluccas. It is called *Cuju Soulamon* in the island of Ternatea. The fruit of *Mundia spinosa* is eatable. The whole plant, and especially the root, of *Monnina polystachya* is very bitter and saponaceous. It is said to have the same properties as Senega, and is particularly used in dysentery by the Peruvians; the ladies of Peru ascribe the beauty of their hair to the use of its infusion, and the silversmiths of Huanuco employ it for cleansing and polishing wrought silver.

The drug called *Rhatany-Root* is the root of *Krameria triandra*, a native of Peru, on the declivities of sandy mountains. It is called by the Peruvians *Ratanhia*, and was first made known in Europe by Ruiz, a Spanish botanist, who during his travels in Peru had frequently seen it employed, and had himself used it with success. It is gently tonic and powerfully astringent; and is particularly efficacious against chronic diarrhoeas, and passive hemorrhages. It is extensively imported into Portugal for the purpose of

communicating a rich high colour to red wines. The colour which is given to Port wine renders it an article of great and deserved value to the manufacturer. These roots are composed of a dark reddish brown, slightly fibrous, easily separated bark, and a central woody portion less coloured, but still reddish, or reddish yellow. They are without smell, but have a bitter, very astringent, slightly sweetish taste, which is connected with its medical virtues, and is much stronger in the bark than in the woody part. Rhatany root has been found to contain tannin, lignin, and minute quantities of gum, starch, saccharine matter, and an acid to which the peculiar properties of the root are supposed to be owing, called *Krameric acid*.



ORDER XXI.—TREMANDRACEÆ—PCREWORTS.

THIS small family is distinguished from the Milkworts by having the stamens free, the anthers two or four-celled, and the corolla regular.

It is composed of small elegant heath-like shrubs, with *Leaves* alternate or in whorls, without leaflets at their base; simple or toothed, and often furnished with glandular hairs. *Flowers* regular, hermaphrodite, solitary; the flower-stalks issuing from the axils of the leaves. The *Calyx*, which early falls off, is composed of four or five unequal segments with a valvate æstivation, that is, their margins placed close together before the opening of the flower-bud (Fig. 11). *Petals* equal in number to the segments of the calyx, and alternating with them; longer than the stamens, and with their margins inrolled in the bud, Fig. 43 A (involute æstivation). *Stamens* distinct, eight or ten, and placed in pairs opposite the petals. *Anthers* with two or four cells opening at their apex by a small pore or tube. *Ovary* egg-shaped, compressed, two-celled, each cell containing two or three pendent ovules. *Style* terminated by one or two *Stigmas*. *Fruit* an ovate capsule, compressed, two-celled, opening by two valves and having a partition in the middle of each valve. *Seeds* pendulous, ovate, terminated by a caruncle-like appendage inserted at the apex of the partition. *Embryo* cylindrical, straight, placed in the axis of a fleshy *albumen* with the radicle pointing towards the hilum.



Fig. 43. *Tetratheca cricæfolia*.

GENERA.

Tetratheca, Sm. | *Tremandra*, R. Br. | *Platytheca*, Steetz.

These are all confined to the limits of the Australian continent and Van Dieman's Land. They are not known to possess any marked properties or to furnish any products.

ORDER XXII.—TAMARICACEÆ—THE TAMARISKS.

PLANTS generally shrubby, rarely herbaceous. *Leaves* alternate, without footstalks, very small, resembling scales, or those of heath or cypress. *Flowers* regular, hermaphrodite, arranged in spikes, which are sometimes gathered together into a panicle. *Calyx* permanent, with five, rarely four, deep segments, the edges of which overlap each other; sometimes it forms a tube at its lower part. *Corolla* of four or five petals. *Stamens* from five to ten, being equal or double the number of the petals, united at the base, Fig. F. *Ovary*, Fig. B, single, often triangular, one-celled, with three partitions at the base, Fig. E, sometimes surrounded by a perigynous disk. *Style* simple, or in three divisions, corresponding with the partitions of the ovary. *Fruit* a triangular capsule, one-celled, many-seeded, opening in two or three valves, which bear the seeds, Fig. C. *Seeds* erect or ascending, hairy at the apex, Fig. D, and without albumen. *Embryo* erect.

GENERA.

Tamarix, L. | *Trichaurus*, Arn.
Myricaria, Desv. |

Fig. 44. *Myricaria germanica*.

GEOGRAPHICAL DISTRIBUTION.—

These are confined mainly to the Old World, extending from Siberia to the margin of tropical Africa southwards, and stretching eastward to China. They delight in localities near the sea, and from this circumstance the French and German Tamarisks are generally grown in such situations on the south and east coast of England, where no other trees or shrubs can be made to grow.

PROPERTIES AND USES.—The bark of *Tamarix gallica* has an astringent taste, slightly nauseous and feebly bitter. It yields a great deal of potass by combustion, but is little employed medicinally. Burekhardt states that a species of Manna which exudes from a variety of this tree (*mannifera*) is used by the Bedouin Arabs of the neighbourhood of Mount Sinai with their food; it does not, however, contain any mannite, but consists wholly of mucilaginous sugar. Sonnini, in speaking of *T. orientalis*, Fig. 45, says: "These trees are in general covered with gall-nuts adhering to the branches. These galls are filled with a liquor of a very beautiful deep scarlet, from which the arts may perhaps be able to derive considerable benefit, for the galls are extremely numerous, and the trees that bear them grow all over both Upper and Lower Egypt." It is called *atlé* by the Egyptians. The wood of this tree serves for various purposes; among others for charcoal.

It is the only wood that is common in Egypt either for fuel or manufacturing; and it is one of the few trees which attain any size in the desert. The tree is called *atl*, and *asul* in Arabic, and the Hebrew word *eshel*, rendered *grove* or *tree* in our version of the Old Testament, is so similar that we may with some degree of certainty conclude that it was with this tree that "Abraham planted a *grove* in Beersheba." The largest known specimen of the Oriental Tamarisk is said to be growing at Babylon on the site of the celebrated "Hanging Gardens." The *German Tamarisk* (*Myricaria germanica*) yields by combustion a considerable quantity of fixed salt, which is diuretic and aperient, and approaches to Glauber's salts; the bark is balsamic, bitter, and astringent, and a decoction of it given in doses of two or three drachms, or even an ounce, is considered beneficial in obstructions of the lower viscera and diseases of the spleen. *M. herbacea* is used as tea among the Mongols.



Fig. 45. *Tamarix Orientalis*.

ORDER XXIII.—FRANKENIACEÆ—THE SEA-HEATHS.

THE individuals of this family are either herbaceous or shrubby. The *Leaves* are alternate, opposite, or whorled, entire or serrated, with two leaflets at their base which are wanting only in *Frankenia*. *Flowers* hermaphrodite, proceeding from the axils of the leaves, and arranged in simple or compound spikes, or in panicles. *Calyx* with five segments, united at the base into a furrowed tube, or cleft to the base. *Petals* equal in number to the segments of the calyx and alternate with them, and sometimes clawed, in which case the claws are the length of the calyx, with a spreading limb. *Stamens*, Fig. B, five, eight, or indefinite in number, free, with two-celled anthers which burst laterally at the apex, seldom at the base; filaments filiform. *Ovary* simple, elongated, egg-shaped, or three-sided, and one-celled. *Style* simple, two or three cleft, slender. *Fruit* a capsule, Fig. F, somewhat three-sided, covered by the calyx or inner corolla; with one cell, which opens with three valves, the edges of which are bent inwards and bear the *Seeds*, which are numerous and small, with an erect and straight *Embryo* in the midst of *albumen*, Fig. E.

Fig. 46. *Frankenia pulverulenta*.

TRIBE 1. *Frankeniæ*.—Segments of the calyx united into a tube, Fig. D, Petals clawed, claws the length of the calyx. Stamens six, Fig. B.

GENERA AND SYNONYMES.

<i>Frankenia</i> , L.	<i>Beatsonia</i> , Roxb.	<i>Wormskioldia</i> ,	„ <i>Schumacheria</i> , Sp <i>Streptopetalum</i> , [Hochst.
<i>Nothria</i> , Berg.	<i>Anisadenia</i> , Wall.	[Thonn.	
<i>Franca</i> , Michel.		<i>Tricliceras</i> , DC.	

TRIBE 2. *Sauvageæ*.—Petals and calyx spreading, not clawed; usually furnished with an inner corolla situated between the petals and stamens. Stamens five, seven, or indefinite in number.

GENERA AND SYNONYMES.

<i>Sauvagesia</i> , L.	<i>Schnurmansia</i> , Bl.	<i>Luxemburgia</i> , St. Hil.
<i>Sauvagea</i> , Neck.	<i>Euthemis</i> , Jack.	<i>Plectanthera</i> , M. & Z.
Iron, P. Br.	<i>Lavardia</i> , Velloz.	

GEOGRAPHICAL DISTRIBUTION.—These are pretty well sprinkled over the five parts of the globe, but are most numerous in Africa and the south of Europe, while some reach as far north as Siberia. Some of them are natives of our own shores, *Frankenia pulverulenta* being found on the coast of Sussex, and *F. laevis* on the east coast of Kent.

PROPERTIES AND USES.—None of them are possessed of any remarkable

properties. The Frankeniæ are mucilaginous and slightly aromatic. The leaves of *Beatsonia portulacifolia* are used as tea at the Cape of Good Hope. The Sauvageæ are also mucilaginous. *Sauvagesia erecta* is called by the Caribs *Yaoba*, and by the Brazilians *Yerba de St. Martin*, and is used by them for diseases of the eyes and disorders of the bowels. In the West Indies it is used as a diuretic, and with it the leaves of *S. adima* are eaten by the negroes and creoles of Guiana instead of spinach; the roots are supposed to be emetic. They are an interesting family of plants to cultivate in botanical collections. The Sea-Heaths are ornamental little shrubs or herbs with pretty little flesh-coloured or reddish flowers, and the hardy species are well adapted for growing upon rockwork. *Luxemburgia* is a very elegant genus of plants, with large yellow flowers, and with the habit of a *Rhododendron*: there are only two species of the genus already introduced into this country. They are natives of Brazil.



ORDER XXIV.—ELATINACEÆ—THE WATER-WORTS.

THIS is a small family which formerly belonged to Caryophyllaceæ, but now very properly separated into a distinct order. They are all annual plants with creeping hollow stems which throw out roots from the joints. The *Leaves* are opposite, with membranous leaflets at their base. The *Flowers* are very minute, and issue from the axils of the leaves. *Calyx* of from three to five segments, which overlap each other, and are slightly united at the base. *Petals* equal in number to the segments of the calyx. *Stamens* as many or twice as many as the petals, distinct. *Ovary* of three to five cells, many-ovuled, and terminated by an equal number of *Styles*. *Fruit* a capsule, with from three to five cells, opening by as many valves, the edges of which are either flat or incurved. *Seeds* numerous, without *albumen*. *Embryo* straight, with the radicle turned towards the hilum.

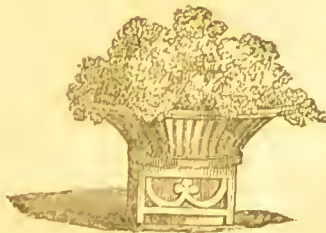
Fig. 47. *Elatine hexandra*.

GENERA AND SYNONYMS.

<i>Elatine</i> , <i>L.</i>	<i>Potamopitys</i> , <i>Bxb.</i>	<i>Merimea</i> , <i>Camb.</i>	<i>Anatropa</i> , <i>Ehrenb.</i>
<i>Cryptina</i> , <i>Raf.</i>	<i>Bergia</i> , <i>L.</i>	<i>Tetradichis</i> , <i>Stev.</i>	? <i>Tridia</i> , <i>Korth.</i>
<i>Biolia</i> , <i>Bellard.</i>	<i>Laneretia</i> , <i>Del.</i>		

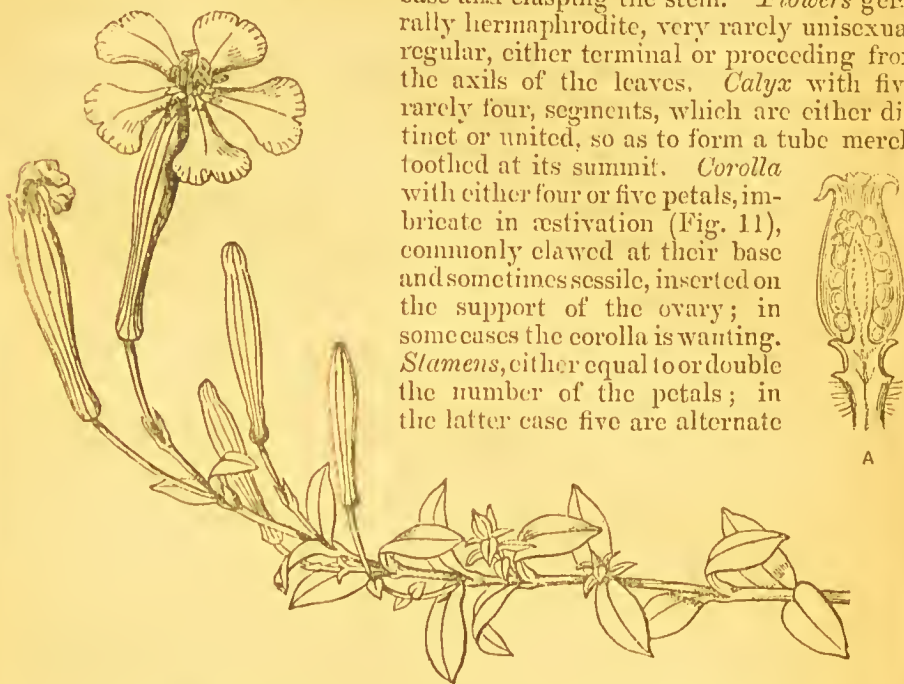
GEOGRAPHICAL DISTRIBUTION.—These are dispersed over the whole surface of the globe, and are found in marshes and ditches.

PROPERTIES AND USES.—They are plants possessing little or no interest, the whole family consisting of only a few insignificant weeds.



ORDER XXV.—CARYOPHYLLACEÆ.—THE PINKS.

HERBACEOUS plants, rarely shrubs. *Stems* branching into forks with swollen joints. *Leaves*, simple, opposite entire, frequently uniting at the base and clasping the stem. *Flowers* generally hermaphrodite, very rarely unisexual, regular, either terminal or proceeding from the axils of the leaves. *Calyx* with five, rarely four, segments, which are either distinct or united, so as to form a tube merely toothed at its summit. *Corolla* with either four or five petals, imbricate in æstivation (Fig. 11), commonly clawed at their base and sometimes sessile, inserted on the support of the ovary; in some cases the corolla is wanting. *Stamens*, either equal to or double the number of the petals; in the latter case five are alternate

Fig. 48. *Silene Shafta*. A, Section of Fruit of *Lychnis dioica*.

with the petals, and five are opposite them, and are united beneath with the claws; filaments awl-shaped, sometimes united at their base; anthers with two cells opening longitudinally. *Ovary* one-celled, many-ovuled, rarely with from two to five incomplete cells. *Styles* two to five, thread-like, distinct, bearing the *Stigmas* on their internal surface. *Fruit* a one-celled capsule, Fig. A, many-seeded, opening at its summit by teeth which separate from each other, or by complete valves; very rarely is the fruit an unopening berry, as in *Cucubalus*. *Seed* sometimes flat and membranous, sometimes rounded. *Embryo* external, curved round the mealy *albumen*.

TRIBE 1. *Alsineæ*.—Segments of the calyx four or five, free, or hardly united at their base.

GENERA AND SYNONYMS.

<i>Sagina</i> , L.	<i>Siebera</i> , Schrad.	<i>Ammonalia</i> , Desv.	<i>Bryomorpha</i> , KrL.
<i>Phalœ</i> , Dumort.	<i>Rhodalsine</i> , Gay.	<i>Lepyrodialis</i> , Fenzl.	<i>Arenaria</i> , L.
<i>Alsinella</i> , Dill.	<i>Greniera</i> , Gay.	<i>Merkia</i> , Fisch.	<i>Alsinanthus</i> , Desv.
<i>Ammodenia</i> , Gmel.	<i>Triplateia</i> , Bartl.	<i>Wilhelmsia</i> , Reh.	<i>Dufourea</i> , Gren. p.
<i>Buffonia</i> , Sauv.	<i>Hymenella</i> , M. & [S.]	<i>Dolophragma</i> , Fenzl.	<i>Plinthine</i> , Rehb.
<i>Bufonia</i> , L.		<i>Thylacosperma</i> , [Fenzl.]	<i>Möhringia</i> , L.
<i>Queria</i> , Lœffl.	<i>Honkenya</i> , Ehrh.	<i>Periandra</i> , Camb.	<i>Krascheninikovia</i> , [Turcz.]
<i>Cherleria</i> , Hall.	<i>Halianthus</i> , Frs.	<i>Flourensia</i> , Camb.	<i>Brachystemma</i> , Don
<i>Alsine</i> , Wahlenb.	<i>Hallia</i> , Dumort.		

Odontostemma, <i>Bnt</i>	Pycnophyllum,	Mollugo, <i>L.</i>	Mallogonum, <i>Fzt.</i>
Holostium, <i>L.</i>	[<i>Remy.</i>	Cerviana, <i>Min.</i>	Cælanthum, <i>E. M.</i>
Cerastium, <i>Huds.</i>	Adenonema, <i>Bunge.</i>	Trichlis, <i>Hall.</i>	Aerosanthes, <i>E. & Z.</i>
Stellaria, <i>Debr.</i>	Cerastium, <i>L.</i>	Pharnaceum, <i>L.</i>	Schiedea, <i>C. & S.</i>
Spergulastrum, <i>Mz</i>	Esmarchia, <i>Rehb.</i>	Ginginsia, <i>DC.</i>	Colobanthus, <i>Bart.</i>
Stellaria, <i>L.</i>	Alsinella, <i>Mönch.</i>	Hyptelis, <i>E. Mey.</i>	Polpodia, <i>Presl.</i>
Alsinella, <i>Benth.</i>	Malachium, <i>Fries.</i>	Psammotropha, <i>E.</i>	Adenogramma, <i>Rech</i>
Larbrea, <i>St. Hil.</i>	Myosoton, <i>Mönch.</i>	[<i>& Z.</i>	Steudalia, <i>Presl.</i>

TRIBE 2. *Sileneæ*.—Segments of the calyx united into a cylindrical tube, which is four or five toothed at the apex.

GENERA AND SYNONYMES.

Velezia, <i>L.</i>	Banffya, <i>Baumg.</i>	Silene, <i>L.</i>	Hedeoma, <i>Lour.</i>
Dianthus, <i>L.</i>	Saponaria, <i>L.</i>	Bootia, <i>Neck.</i>	Wahlbergella, <i>Rupr</i>
Tunica, <i>Scop.</i>	Bootia, <i>Neck.</i>	Viscaria, <i>Röhl.</i>	Cucubalus, <i>T.</i>
Kolrauschia, <i>Knth</i>	Heliosperma, <i>Rch.</i>	Coronaria, <i>L.</i>	Scribæa, <i>Fl. W.</i>
Pseudotunica, <i>Fzl</i>	Melandrium, <i>Fries.</i>	Agrostemma, <i>L.</i>	Lychnanthus, <i>Gm</i>
Heliosperma, <i>Grsb.</i>	Vaccaria, <i>Medik.</i>	Githago, <i>Desf.</i>	Drypis, <i>Michx.</i>
Gypsophila, <i>L.</i>	Eudianthe, <i>Rehb.</i>	Ucbelinia, <i>Hochst.</i>	Acanthophyllum,
Hagenia, <i>Mon.</i>	Ankyropetalum,	Petrocoptis, <i>Braun.</i>	[<i>C.A.M.</i>
Rojejeka, <i>Fisch.</i>	[<i>Fzl.</i>	Lychnis, <i>T.</i>	

GEOGRAPHICAL DISTRIBUTION.—This family inhabits for the most part the temperate and colder parts principally of the northern hemisphere. They are much more rare in the southern; and any that are found between the tropics, are generally at high altitudes among the mountains, and bordering the limits of perpetual snow.

PROPERTIES AND USES.—The Carnation and the Pink, so well known and so highly appreciated for the beauty and the extremely agreeable and aromatic fragrance of their flowers, belong to this family; none of them, however, possess properties, either of a medicinal or economical character, to call for any particular notice. In fact, with the exception of the *Soapwort* (*Saponaria officinalis*), which has a bitter taste, and is mucilaginous, they are generally speaking insipid and useless. This has been frequently employed in decoction as a sudorific, in diseases of the skin, and in gout. The leaves with water form a lather like soap, and will take out grease in the same manner. This property, as well as the medical virtue of the plant, resides in a peculiar principle obtained from the plant by Bucholz, which he called *Saponin*; and this principle constitutes 34 per cent. of the dried root, which contains also a considerable quantity of gum and a little bassorin, resin, and altered extractive, besides lignin and water. Saponin is brown, somewhat translucent, hard and brittle, with a sweetish taste, followed by a sense of aerimony in the fauces. It is soluble in water and in officinal alcohol, but is insoluble in pure alcohol, ether, and the volatile oils. Its watery solution froths when agitated. *Gypsophila struthium* possesses the same saponaceous properties, and is used by the Spaniards for scouring instead of soap.

The *Alsinææ* are either weeds or afford little attraction. The *Common Chickweed* (*Stellaria media*), of which birds are so fond, is perhaps the best known of any of the plants belonging to this tribe. It is abundant in every garden, but those who have only seen it in its usual state, would hardly know it again in woods, where it sometimes exceeds half-a-yard in

height, and its leaves nearly two inches long, and more than one broad. This plant, says Linnæus, furnishes a beautiful instance of what is called the *Sleep of Plants*. Every night the leaves approach each other in pairs, so as to include within their upper surfaces the tender rudiments of the young shoots; and the uppermost pair but one, at the end of the stalk, are furnished with longer leaf-stalks than the others, so that they can close upon the terminating pair, and protect the end of the shoot. The young shoots and leaves, when boiled, can scarcely be distinguished from spring spinach, and are equally wholesome. *Arenaria marina*, the *Sea Sandwort*, is found on the coast of Cornwall, Devon, the Isle of Wight, and many parts on the sea-side, and is so succulent that great quantities of it are pickled and sold as samphire.

The *Silenæ* contain many popular plants of great floral interest. The *Clove Gilliflower* (*Dianthus caryophyllus*), so called from its odour resembling the clove spice, is an old and justly esteemed garden favourite. Long ago, it was used to give a spicy flavour to ale and wine, and thus we find old Chaucer saying:

Ther springen herbes grete and small.
The licoris and the setewale,
And many a clove gilofre,
_____ to put in ale,
Whether it be moist or stale.

And from this circumstance it was called *Sops in wine*. The double varieties are called *Carnations*. Spencer says in his *Shepherd's Calendar*:

Bring hether the Pinke and the Purple Cullambine,
With Gelliflowres;
Bring Coronations and Sops in Wine,
Worn of paramours.

Gerard says, "The conserve made of the flowers of the Clove Gilliflower and sugar is exceeding cordial, and wonderfully above measure doth comfort the heart, being eaten now and then."

The flowers of the Clove Gilliflower are employed to impart colour and flavour to a syrup, which serves as a vehicle for other less pleasant medicines. Those are selected for the purpose which have the deepest red colour and the most aromatic odour. The petals should not be collected till the flower is fully blown, and should be employed in the fresh state. Their taste is sweetish, slightly bitter, and astringent. They yield a fragrant essential oil by distillation. They are also used in perfumery and confectionery.

Here also we have the *Garden Pink* (*D. plumarius*), which contributes so much to the beauty and fragrance of our garden herbaceous borders; and the *Sweet William* (*D. barbatus*), that old inhabitant of our villa and cottage gardens, the narrow-leaved varieties of which were called *Sweet Johns*, a name now little heard of.

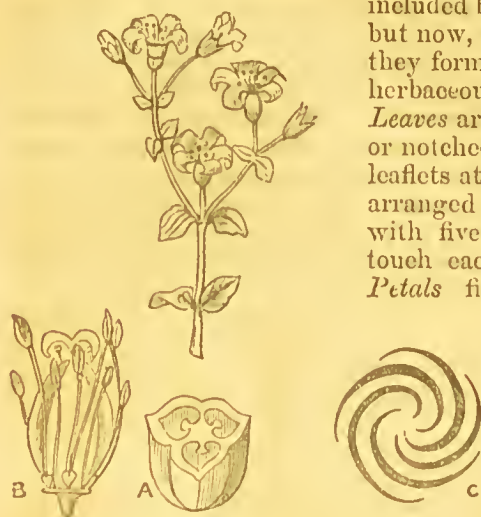
The *Bladder Catchfly* (*Silene inflata*), so common in the cornfields and pastures, may be used as a substitute for Asparagus or Green Peas, the young shoots having the flavour of both. They ought to be gathered when about two inches long, and the more they are blanched the better. Bryant says: "Our kitchen gardens scarcely furnish a better flavoured salad than

the young tender shoots of this plant when boiled. They ought to be gathered upon tilled land, and when they are not above two inches long. If the plant were under cultivation, no doubt but it would be improved, and would well reward the gardener's labour, by reason it sends forth a vast quantity of sprouts, which might be nipped off when of a proper size, and there would be a succession of fresh ones for at least two months. It being a perennial too, the roots might be transplanted into beds like those of asparagus." The dried roots were formerly sold in shops, under the name of *Behen album*, as a cordial and cephalic. A strong decoction of the roots of *Silene virginica* is said to be efficacious as an anthelminic, and to be regarded as poisonous by some of the American Indians. *Vaccaria vulgaris* is said to increase the secretion of milk in cows that feed upon it; and the seeds are possessed of diuretic properties. *Pharnaceum mollugo*, which grows plentifully in Caffraria, according to Thunberg, causes cattle to fatten rapidly. The seeds of *Corn Cockle* (*Agrostemma githago*) are said to render flour unwholesome, when ground along with it.



ORDER XXVI.—VIVIANIACEÆ—THE VIVIANIA FAMILY.

THIS is composed of a few plants some of which were formerly arranged in the Pink family, and the whole have been included by some authors among the Mallows; but now, by the general consent of botanists, they form a separate family, which consists of herbaceous or half-shrubby plants. The *Leaves* are either opposite or in whorls, entire or notched, often downy beneath, and without leaflets at their base. *Flowers* hermaphrodite, arranged in panicles or corymbs. *Calyx* with five segments, the margins of which touch each other (valvate), and ten-ribbed. *Petals* five, long-clawed, with a twisted æstivation, Fig. c, that is, the petals are folded up in the form indicated in the figure before the flower-bud opens. *Stamens* ten, those opposite the petals inserted into a fleshy gland, Fig. B; anthers two-celled, opening lengthwise. *Ovary* free, three-celled, Fig. A, opening through the cells, the

Fig. 49. *Viviania marifolia*.

valves bearing the partitions in the middle. *Seeds* rather rough, with a large quantity of fleshy *Albumen* which contains a curved *Embryo*.

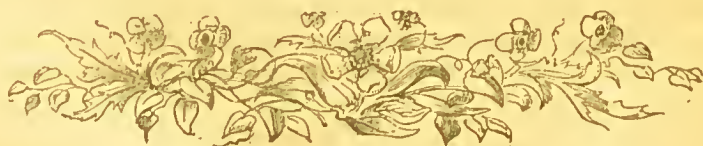
GENERA AND SYNONYMES.

Cæsarea, Cambess.
Viviania, Cav.

„ Macraea, Lindl.
Xeropetalon, Hook.

Cissarobryon, Pöpp.
Linostigma, Klotzsch.

GEOGRAPHICAL DISTRIBUTION.—These are natives of Chili and Brazil. They are very pretty ornamental plants, but not more than two species of them have yet been introduced to this country. It is not known that they possess any properties or are applied to any useful purposes.



ORDER XXVII.—MALVACEÆ—THE MALLOW FAMILY.

THIS family is composed of herbaceous plants, shrubs, and trees, with alternate, simple, or lobed *Leaves*, furnished with leaflets at their base. *Flowers* hermaphrodite, regular, and showy.

Calyx with five, rarely three to four, divisions, often accompanied externally with leaflets varying in number, and variously united, which form an outer calyx; the margins of the segments are placed close together previous to expansion, and therefore called valvate, Fig. E. *Corolla* with five petals, which are alternate with the segments of the calyx, and spirally twisted before opening, Fig. 49 c, united by their claws to the base of the tube formed by the union of the filaments, so that the corolla falls off entire. *Stamens* indefinite in number, united by their filaments into the form of a tube which sheathes the *Style*. *Anthers* kidney-shaped and always one-celled. The *Pistil*, Fig. B, is composed of an *Ovary* with numerous carpels arranged in a whorl round a central axis, and more or less united together, sometimes connected into a kind of head; these carpels are one-celled, containing one,

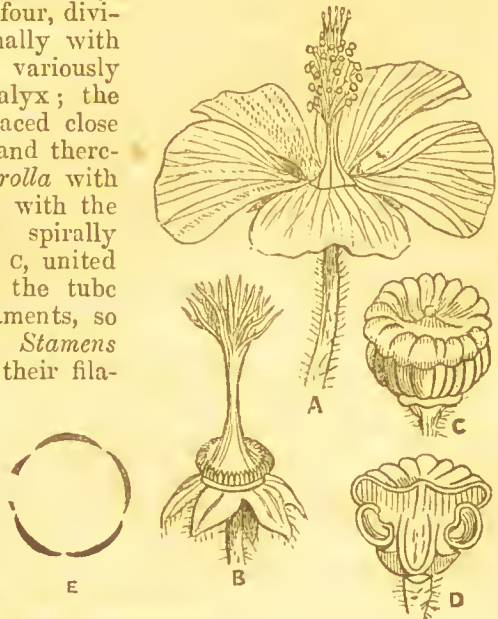


Fig. 50. A, Flower of *Malva alcea*. B, Pistil of *Alcea rosea*. C and D, Fruit of *Lavatera trimestris*.

two, or a great number of ovules attached at their inner angle. *Styles* equal in number to that of the ovaries or of the cells, distinct, more or less united at their base, and each bearing on its summit a simple *stigma*. *Fruit* composed of a number of seed-vessels, Fig. C, arranged round a central axis, or collected into a head, and sometimes formed by their union into a many-celled capsule, which opens into as many valves as there are one or many-seeded cells. *Seeds* ovate or somewhat three-sided, sometimes covered with a long cottony down; *Albumen* none, or in small quantity, mucilaginous, almost fleshy. *Embryo* straight, with twisted seed-leaves, which are folded upon themselves, Fig. 34 b.

This family is divided into the four following tribes:—

TRIBE 1. *Malopeæ*.—Calyx generally, but not always, double. Fruit composed of numerous one-celled, one-seeded carpels, which are formed into a head.

GENERA AND SYNONYMES.

Palava, Cav. | „ *Palavia*, Mönch. | *Malope*, L. | *Kitaibelia*, W.

TRIBE 2. *Malvææ*.—Calyx double. Fruit composed of carpels, which are either free or united into a many-celled capsule.

GENERA AND SYNONYMS.

Lavatera, <i>L.</i>	Nuttalia, <i>D. & B.</i>	Sphaeraleca, <i>St. Hil.</i>	„ Cancellaria, <i>DC.</i>
Savinionia, <i>W. & B.</i>	Anthema, <i>Medik.</i>	Phymosia, <i>Desv.</i>	Pentaspermum,
Navæa, <i>W. & B.</i>	Callirhœe, <i>Nutt.</i>	Sphaeroma, <i>DC.</i>	[<i>DC.</i>
Althæa, <i>L.</i>	Napæa, <i>Clayton.</i>	Modiola, <i>Mönch.</i>	Thorntonnia, <i>Reh</i>
Ferberia, <i>Scop.</i>	Sidalcea, <i>Gray.</i>	Haynea, <i>Reich.</i>	Columella, <i>Com.</i>
Aleca, <i>L.</i>	Malvastrum, <i>Gray.</i>	Urena, <i>L.</i>	Anotea, <i>DC.</i>
Malva, <i>L.</i>	Meliphlea, <i>Zucc.</i>	Pavonia, <i>Cav.</i>	

TRIBE 3. Hibiscæ.—Calyx double. Fruit composed of from three to five, rarely ten, many-seeded carpels, united into a many-celled capsule.

GENERA AND SYNONYMS.

Kosteletzkyia, <i>Prsl.</i>	Cienfuegia, <i>W.</i>	Abelmoschus, <i>Med.</i>	Pariti, <i>Rheed.</i>
Hibiscus, <i>L.</i>	Redoutea, <i>W.</i>	Bamia, <i>R. Br.</i>	Azanza, <i>M. & S.</i>
Ketmia, <i>T.</i>	Serrea, <i>Cav.</i>	Hymenocalyx, <i>Zu</i>	Thespesia, <i>Corr.</i>
Malvaviscus, <i>Dill.</i>	Senraea, <i>W.</i>	Manihot, <i>DC.</i>	Malvaviscus, <i>Grt.</i>
Achania, <i>Swtz.</i>	Senra, <i>DC.</i>	Legunaria, <i>Don.</i>	Decaschistea, <i>W & A</i>
Fugosia, <i>Juss.</i>	Dumreicheria, <i>S.</i>	Sturtia, <i>R. Br.</i>	Gossypium, <i>L.</i>
Cienfugosia, <i>Cav.</i>	[& <i>H.</i>	Paritium, <i>A. Juss.</i>	Xylon, <i>T.</i>

TRIBE 4. Sideæ.—Calyx single. Fruit composed of five or more carpels, united into a many-celled capsule.

GENERA AND SYNONYMS.

Anoda, <i>Cav.</i>	Malvinda, <i>Medik</i>	Abutilon, <i>Gart.</i>	Triguera, <i>Cav.</i>
Fleischeria, <i>Steud.</i>	Periptera, <i>DC.</i>	Lawrencia, <i>Hook.</i>	Wissadula, <i>Medik.</i>
Cristaria, <i>Cav.</i>	Dictyocarpus, <i>Wt</i>	Bastardia, <i>Kunth.</i>	—
Sida, <i>L.</i>	Gaya, <i>Kunth.</i>	Lagunea, <i>Cav.</i>	Ingenhousia, <i>M. & S.</i>
Stewartia, <i>Forsk.</i>	Malachra, <i>L.</i>	Solandra, <i>Murr.</i>	Astrochlena, <i>Greke</i>

GEOGRAPHICAL DISTRIBUTION.—The great majority of the individuals of this family is found between the tropics; they diminish in frequency towards the North, and are not known to exist in the frigid zone. They are more abundant in the New than in the Old World.

PROPERTIES AND USES.—All the Mallow family contain in their several parts a considerable quantity of mucilage and of fibre.

The Malvæ or Mallow Tribe includes the *Marsh Mallow* (*Althæa officinalis*), so valuable as an emollient, from the great quantity of mucilage which abounds in all its parts, but particularly in the roots. These are about the thickness of a finger, and from a foot to a foot and a half in length. They are collected in autumn from plants at least two years old, and then dried; the outer skin is removed, and they are thus sent to market. The virtues which the roots and leaves contain are exclusively those of a demulcent and emollient in diseases attended with pain, irritation, and inflammation of the mucous membrane. It is formed into a decoction and drunk in pulmonary complaints; or bruised, boiled, and formed into poultices and fomentations. By confectioners it is made into a lozenge, under the name of *Pâte de Guimauve*. The whole plant abounds in fibre, mucilage, starch, and saccharine matter. A principle was discovered in the root by M. Bacon, which has been found to be identical with *Asparagin*. The *Marsh Mallow* is used in the East as an article of food, to which, in seasons of scarcity, even the wealthy are compelled to resort. It is called

Molochia. Many of the poorer inhabitants of Syria, especially the Fellahs, the Greeks, and the Armenians, subsist for weeks on herbs, of which the Marsh Mallow is one of the most common. When boiled first, and then fried with onions and butter, they are said to form a palatable dish; and in times of great scarcity, consequent upon the failure of the crops, all classes may be seen striving with eagerness to obtain the much desired plant, which fortunately grows in great abundance. In Job xxx. 3-4, we read, "For want and famine they were solitary, fleeing into the wilderness in former time desolate and waste, who cut up mallows by the bushes." *Lavatera arborea*, or *Tree Mallow*, a native of this country, also contains a great quantity of fibre. To this tribe belong also the *Holyhock* (*Althæa rosea*), the giant of the flower-garden, and the *Chinese Holyhock* (*A. chinensis*). The former of these is well known to contain in its stalks a great quantity of fibre, from which a good strong cloth has been manufactured; and in the year 1821 about 280 acres of land near Flint in Wales were planted with the Common Holyhock, with the view of converting the fibre to the same uses as hemp or flax; it was found that in the process of manufacture the plant yields a blue dye, equal in beauty and permanence to that of the best indigo. The flowers of the red variety are slightly astringent. The fibre of *A. cannabina* is extracted in the south of Europe.

The Mallows possess properties very similar to the preceding. The *Common Mallow* (*Mulva sylvestris*), so plentiful and so pretty on every roadside, is frequently used in the form of a decoction in catarrhal, dysentrie, and nephritic complaints, and as poultices and fomentations. *Malva rotundifolia*, the *Round-leaved Mallow*, is sometimes used for the same purposes, but less frequently. The fibre furnished by *M. crispa* is separated in Syria. *Sphæralcea cisplatina* is used in India for the same purposes as Marsh Mallows are in this country; and the root and stem of *Urena lobata*, in the form of a decoction, is employed in Brazil as a remedy in windy colic, and the flowers as an expectorant in dry and inveterate coughs. *U. lobata*, called *bun-ochra*, and *U. sinuata*, called *Kungia* in India, abound in a strong fibre, which forms a tolerably good substitute for flax. A decoction of *Pavonia diuretica* is employed with success as a diuretic in dysuria in Brazil; but is supposed to act rather as an emollient.

The *Hibiscæ* are remarkable more for the great quantity of strong fibre which they contain. *Hibiscus cannabinus*, or *Ambaree Hemp*, is grown extensively all over India, the leaves being used as an esculent vegetable, are slightly acid, and have the flavour of sorrel; and the bark affords a great quantity of fibre, which varies in quality according to the climate in which it is produced. In many parts of India the common cordage of the country is made exclusively of the fibre of this plant; and in Behar it is cultivated for the sole purpose of being made into ropes, which are considered stronger and more durable than those made of Jute. Roxburgh says that he found the fibre to be stronger when obtained from full grown plants that had ripened their seed, than when cut from plants in blossom. On the Coromandel and Malabar coast a coarse sack-cloth is made of it. Dr. Royle says the length of the fibres is from five to six feet; they are of a paler brown than the ordinary Brown Hemp, harsher in feel, and stick more together, as if all the gum had not been washed out; but they are

divisible into fine fibres, possessed of considerable strength, and well calculated for rope-making, as also for coarse fabrics. The mucilage obtained from the root of *H. manihot* is used in Japan to give a consistence to paper; and the petals of that beautiful stove-plant *Hibiscus Rosa-sinensis* are used at Batavia for blackening leather and shoes, hence it is called *Kambang sapato* (Shoe-flower). The Chinese make use of these elegant flowers to form garlands and festoons on all occasions of festivity, and even in their sepulchral rites. The women also employ them to colour their hair and eyebrows black. The *Althæa frutex* (*Hibiscus syriacus*), which contributes so much beauty to shrubberies in the autumn months by the profusion of their large and variously coloured flowers, belong to this family.

Hibiscus esculentus (*Abelmoschus esculentus*) is the *Ochro* or *Okro* of the West Indies, the *Gombaud* or *Gombo* of France, the *Baudikai* of Madras, and the *Ram turai* and *Dhenroos* of Bengal. This plant is cultivated as a potherb in the warm countries of Asia, Africa, and America, and also in some parts of the south of Europe and the Levant. The parts used are the long pyramidal young seed-pods, gathered when green, which are filled with a large porportion of nutritious mucilage, and form a jelly with water. They are used for thickening soups; and, when buttered and spiced, make an excellent dish. The seeds are used in soups in the same way as we do barley, and they have also been recommended when roasted as a substitute for coffee. Besides as an ingredient in soups, the *ochro* is thus employed: before the pods have arrived at maturity, of whatever size they may be, they are first boiled in water, then dried a little, and allowed to cool; after which they are cut transversely into two equal parts, retaining the seeds. They are then placed in layers one over the other, and vinegar and oil poured over them, and seasoned with pepper and salt. After being boiled, they may also be eaten with the gravy of meat. These pods, which are from two to six inches long, are the chief ingredient in the celebrated *pepper-pot* of the West Indies, which is considered a rich dish, the other ingredients being either flesh, or dried fish and capsicums. As a medicine, *ochro* is employed in all cases where emollients and lubricants are necessary. The bark of this plant abounds in fibre, which is of fine quality. *H. (Abelmoschus) bammia* is the *African ochro*, which Dr. Royle seems to think does not differ materially from the preceding; but G. Don, who was acquainted with, and had partaken of both species in their native situations, regards them as distinct. Speaking of the *Bammia*, he says: "We have seen it cultivated with the *Okro*, or *H. esculentus*; it is called the *Autumnal Okro*, and the young pods are used to make *Okro soup*. It differs from *H. esculentus* in the leaves not being so deeply lobed and in the pods being much longer." *H. mutabilis* is a beautiful stove plant, a native of the East Indies. The flowers are both single and double, but generally double, and then somewhat like those of a holyhoek. In the morning, they are white, and towards noon they change to a flesh colour; but as evening draws on they become of a beautiful rose.

Hibiscus abelmoschus (*Abelmoschus moschatus*), is the *Musk ochro*. Its name is derived from the Arabic *hub-ool mooshk*. It is originally a native of the East Indies and South America, but now naturalized in Egypt and the Antilles. It is cultivated for its large seeds, which have an odour some-

what between musk and amber, and which are employed as a substitute for animal musk. It is cultivated in Martinique, whence it is largely exported to France, where it is employed by perfumers in the preparation of pomatums, powders, and perfumes, by whom it is called *Ambrette* and *Graine d'Ambrette*. In Egypt and Arabia the natives bruise this seed, and mixing it with their ground coffee, regard it as a cordial and stomachic. The plants abound in a great quantity of mucilage, which is much employed in the north-west of India for the purpose of clarifying sugar. It is called in India *Mooskdana* and *Calce Kustoorce*. *H. sabdariffa* is the *Red Sorrel* of the West Indies, and the *Rozelle* or *Rouselle* of the Madras territories. In the East it is cultivated in most gardens for its calyxes, which, when they ripen, become fleshy, and being of a pleasantly acid taste are used in making tarts, as well as an excellent jelly; and in the West Indies, besides the uses already mentioned, a decoction of them sweetened and fermented, is called *Sorrel Cool-Drink*, and much used in the sugar colonies, where it is esteemed as a refreshing beverage. The leaves are used in salads. The bark contains a great mass of fibre, the extremity of which is of a fine silky nature. *H. tiliaceus* is the *Maho* of the West and the *Bola* of the East Indies. Dampier says the Mosquito Indians make their lines both for fishing and striking with the bark of this plant. He says, "it is fit for any manner of cordage, and privateers often make their rigging of it." The Tahitians call it *poerou*, and from the bark they manufacture excellent matting, a coarse sort, which serves them to sleep upon, and a finer to wear in wet weather; and of the same they make ropes and lines, from the thickness of an inch to the size of a small pack-thread. The fibre is said to gain in strength when tarred. Forster states that the bark of this species is sucked in times of scarcity, when the bread-fruit fails. It was with the bark of this tree that the whips were made which were used in punishing the slaves in the West Indies.

It would be needless to enlarge further on the other species of this genus, all of which contain, in a greater or less degree, the mucilaginous and fibrous properties of those already mentioned; and before proceeding to the consideration of the most important plant of the whole family, we would remark that, considering the facility with which these plants can be cultivated, the great amount and small expense of labour, and the unlimited extent of land which can be brought into operation, it might be worth the while of our colonists to direct their attention to the production of a supply of such fibre which, if it did not supplant the use of flax and of hemp, might at least be as suitable to many purposes to which these are now applied; and would, to some extent, render us independent of the supplies of these articles from other countries. For the manufacture of paper particularly, a material possessing so much of mucilaginous and fibrous ingredients we would conceive to be particularly adapted.

The most important plants of the whole family are those producing *Cotton*, which is not a fibrous but a cellular substance, enveloping the seeds of all the species of *Gossypium*; there are therefore many varieties of this article as they are produced by various plants. *Gossypium herbaceum*, or *Common Cotton*, is the species which is most generally cultivated. It is grown in the East and West Indies, North and South America, Syria and Egypt; and in the south of Europe, in Malta, Sicily, and Naples. It is an

annual plant, growing from three to four feet high, with yellow flowers having a purple spot on each of the petals, which are succeeded by capsules or seed vessels about the size of a medium sized apple, containing seeds which are enveloped in cotton.

Formerly our supply of Cotton came from Syria, the Levant, and the south of Europe. The "cotton wool" was brought from Cyprus, St. Jean d'Acre, and Smyrna; and the "cotton thread" from Damascus and Jerusalem; the former being called *cotton d'ounce* and the other *bazas*. The cotton of the Antilles was of such extraordinary fineness that it surpassed silk in softness. Cotton fabrics were introduced to Western Europe from Asia through the commercial activity of the Mahommedans, and Mosul in Mesopotamia is supposed to have given the name to *muslin*, Calicut to *calico*, and Nankin to that known by its peculiar tawny colour as *nankeen*.

Our present supplies are chiefly obtained from the southern states of North America, more than four-fifths being derived from that country, where the produce now exceeds that of the whole world in 1770. There are three varieties of the Common Cotton cultivated in America: the first, from its yellow colour, is called *Nankeen Cotton*, introduced at an early period from China; the second, *Green-seed Cotton*, producing white cotton with green seeds; and the third, *Black-seed Cotton*, producing white cotton and black seeds. The second variety grows in the middle and upper country, and is a fine white variety called *Short-staple Cotton*, or *Upland Cotton*, and sometimes *bowed Georgia Cotton*, from a method which was formerly employed in cleaning it; a large bow being placed in a heap of cotton, and the string being made to vibrate powerfully, disperses and cleanses the heap. The third variety is cultivated on the low sandy islands near the shore from Charlestown to Savannah, and has long been celebrated as *Sea Island Cotton* for its long staple and its strong silky texture.

The Cottons of India are produced from the same plant as the American, but there are several varieties of the product. First, *Dacca Cotton*, which furnishes that long, fine, soft cotton-wool employed in manufacturing the very delicate, beautiful muslins of that place. Second, *Berar Cotton*, distinguished by growing to a greater size, and having wool of a finer quality than that of the common species. It is cultivated in Berar and the Northern Circars, and with its cotton the fine Madras, or, more properly, Northern Circar, long-cloth is made. Third, *China Cotton*, introduced to Bengal, where its wool is reckoned twenty-five per cent. better than that of Surat.

Nankeen Cotton is supposed to be produced by *G. religiosum*, and naturally possesses that pale yellow nankeen colour without dyeing. It is a native of China and the East. *Barbadoes Cotton* is the produce of *G. Barbadosense*, and is the sort generally cultivated in the West Indies. *Indian Cotton* is furnished by *G. indicum*, and that of Persia by *G. micranthum*. *G. arboreum* is the *Tree Cotton*, cultivated in India and in Africa; it is a shrub growing from four to ten feet high. Dr. Royle was informed by Huree Sing, the head gardener in the Botanic Garden at Saharunpore, that the cotton of *G. arboreum* was never used for making any of the lower garments, but only for turbans for the head, as it was sacred to their deities. According to Dr. Royle, Cotton, though used chiefly for clothing,

is, in India, also employed to a considerable extent for cordage, as, for instance, for tent-ropes, of which so many are required for the use of the army, and made chiefly of Cotton, as are all the tents themselves. So Cotton ropes are also employed for many domestic purposes. Some of the native shipping also, and even a few American ships, are rigged with cotton ropes, while Cotton canvas is also employed for sails, especially on the coast of Cutch, where some very good is made, and sells for about three and a half annas per yard.

Cotton consists of filaments which, under the microscope, appear to be flattened tubes, with occasional joints indicated by transverse lines. It is insoluble in water, alcohol, ether, the oils, and vegetable acids; but soluble in strong alkaline solutions, and decomposed by concentrated mineral acids. By nitric acid, or a mixture of nitric and sulphuric acid, it is converted into that remarkably explosive substance called *Gun-cotton*. Gun-cotton has the appearance of ordinary cotton, but is harsh to the touch. When ignited, it flashes off like gunpowder, burning without a residue; its inflaming point is at the temperature of 370 degrees. It has been tried as a substitute for gunpowder in fire-arms, but, from its strong bursting power, it has not been found to answer a good purpose. It appears, however, to be well adapted for rock blasting. Gun-cotton is perfectly insoluble in water, and nearly so in strong alcohol, but readily dissolves in acetic ether. As prepared for ordinary commercial purposes, it is insoluble in ether; but when carefully and newly prepared, it dissolves in ether assisted with a little alcohol, and forms *Collodion*.

The seeds of Cotton are bruised for oil, and are eaten, being considered wholesome and nutritious. They have been employed in the southern states of North America with great success in the treatment of intermittents. A pint of the seeds is boiled in a quart of water to a pint, and a tea-cupful of the decoction is given to the patient in bed an hour or two before the expected return of the chill. The root of the Cotton-plant has been found to possess the same properties in promoting uterine contraction as ergot of rye, and is habitually and successfully resorted to by the slaves of the South for procuring abortion, which it does without injury to the general health. Cotton wool is highly beneficial in the treatment of recent burns and scalds; it relieves pain, diminishes inflammation, prevents blistering, and very much hastens a cure. It has also been found highly beneficial in cases of rheumatism, and particularly in lumbago, a large patch of it over the parts affected generally alleviating the pains, and ultimately removing the complaint.

Sidaæ.—This tribe exhibits the same characteristic properties as the rest of the family, abounding as they do in a strong fibre; that of *Sida tiliaefolia* is strong, pliable, and very silky in its nature; the plant is of very rapid and luxuriant growth, three crops being obtained in one year. The fibre may be brought to this country at the estimated price of about 8*l.* per ton, which is about one-fifth of the price of hemp of the best quality. *S. rhomboidea* and *S. rhombifolia* also produce an abundance of very delicate flaxy fibres; that of the former is long, of great strength, and closely resembles silk; a line made of it only half-an-inch in circumference sustained a weight of 400 pounds after exposure to wet and sun for ten days. The fibre of *S. periplo-cifolia* is from four to five feet long, of a soft and silky texture, and is superior to Jute for spinning. The shoots of *S. micrantha* are, on account

of their pliancy, used by the inhabitants of Brazil as rocket-sticks; and by the same people the chewed leaves of *S. carpinifolia* are applied to the bites of wasps and bees. *S. cordifolia*, mixed with rice, is used to alleviate attacks of dysentery, and Hindoo practitioners prepare emollient fomentations from *S. mauritiana*.

Sida Abutilon, a native of various parts of Europe, and also of Asia, yields an abundance of fibre. The Chinese make cords of it. From experiments made by Cavanilles, it appears that the plants succeed best when sown in May, and they arrive at perfection in three months and a half from that time. The maceration of the smaller stalks occupied about fifteen days, and that of the larger one month. The strength and quality of the fibre appeared to be in proportion to the perfection of the vegetation, and to the distance at which the plants were grown apart. The fibre lies in layers, of which there are sometimes six; they are not quite straight, but have an undulating direction, so as to form a network in their natural positions. Their smell resembles that of hemp, and the fibre, though more dry and harsh, is whiter. The harshness is owing to a greenish mucilage which connects the fibres, and the white colour must be always obtained at the sacrifice of having the fibre less soft and pliant; when of its natural hue it is very soft and flexible.



ORDER XXVIII.—STERCULIACEÆ—THE SILK-COTTON FAMILY.

THIS family is composed of large umbrageous trees, rarely shrubs. The *Leaves* are alternate, simple, or compound, and furnished with leaflets at their base. The *Flowers* are either regular or irregular, hermaphrodite, or unisexual by abortion. *Calyx* with five segments, which are united at the base, and always with their margins touching each other in the bud, Fig. 11. *Corolla* with five petals, sometimes with none, and having a twisted æstivation, Fig. 49 c. *Stamens* indefinite in number, either united in five distinct bundles, or forming a column in the centre of the flower; *Anthers* two-celled, turned outwards. *Ovary* free, with five cells, or composed of as many distinct carpels. *Styles* equal in number to the carpels, more or less united, each terminated by a headed *Stigma*. *Fruit* either a capsule with five cells, rarely unopening, or composed of many distinct follicles, sometimes a berry. *Seeds* numerous or solitary in each cell; triangular, sometimes winged, often covered with a silky tuft, having an oily or fleshy *Albumen*, which is rarely wanting, and containing an *Embryo* which is either straight or curved.

Fig. 51. *Cheirostemon platanoides*.

TRIBE 1. *Bombaceæ*.—Flowers perfect. Calyx with five segments, often irregularly divided. Corolla regular, rarely wanting. Leaves palmate, compound, or rarely simple.

GENERA AND SYNONYMES.

<i>Adansonia</i> , L.	<i>Bombax</i> , L.	<i>Salmalia</i> , S. & E.	<i>Chieranthoden-</i>
<i>Baobab</i> , P. Alp.	<i>Eriotheca</i> , S. & E.	<i>Cavanillesia</i> , R. & P.	<i>dron</i> , Lavrado
<i>Ophelus</i> , Lour.	<i>Eriodendron</i> , DC.	<i>Pourretia</i> , W.	<i>Neesia</i> , Blum.
<i>Pachira</i> , Aubl.	<i>Ceiba</i> , Gærtn.	<i>Durio</i> , Rumph.	<i>Esenbeckia</i> , Bl.
<i>Carolinea</i> , L. f.	<i>Ceiba</i> , M. & Z.	<i>Ochroma</i> , Swartz.	<i>Cotylephora</i> , Msn
<i>Chorisia</i> , H. B. K.	<i>Boschia</i> , Krthls.	<i>Cheirostemon</i> Hum.	<i>Montezuma</i> , M. & S.
			<i>Hampea</i> , Schlecht.

TRIBE 2. *Helicterææ*.—Flowers perfect. Calyx and corolla often irregular. Leaves simple.

GENERA AND SYNONYMES.

<i>Plagianthus</i> , Forst	<i>Hoheria</i> , A. Cunn.	<i>Gerberia</i> , Scop.	<i>Helicteres</i> , L.
<i>Asterotrichion</i> , Kl.	<i>Myrodia</i> , Schreb.	<i>Matisia</i> , H. & B.	<i>Ungeria</i> , Schott.
<i>Blepharanth-</i>	? <i>Lexarza</i> , Llav	<i>Methorium</i> , Schott.	<i>Reevesia</i> , Lindl.
<i>[num, Kl.]</i>			

TRIBE 3. *Sterculeæ*.—Flowers unisexual by abortion. Calyx regular, corolla wanting. Leaves simple or palmate, with the footstalks swollen at the top.

GENERA AND SYNONYMES.

Heritiera, <i>Ait.</i>	Theodoria, <i>Neck.</i>	Hildegardia, <i>S. & E.</i>	Erythropsis, <i>Ldl.</i>
Balanopteris, <i>Grt</i>	Chiehæa, <i>Prest.</i>	Cola, <i>Bauh</i>	Pterygota, <i>S. & E.</i>
Sutherlandia,	Mateatia, <i>Fl. Fl.</i>	Lunana, <i>DC.</i>	Pterocymbium, <i>R.</i>
[<i>Gml.</i>	Balanghas, <i>Burm</i>	Edwardia, <i>Raf.</i>	[<i>Br.</i>
Samandura, <i>L.</i>	Cavalam, <i>Rumph</i>	Bieh, <i>Lunan.</i>	Courtenia, <i>R. Br.</i>
Atunus, <i>Rumph.</i>	Asterodendron,	? Culhamia, <i>Frsk</i>	Micrandra, <i>R. Br.</i>
Stereulia, <i>L.</i>	[<i>Dennst.</i>	Seaphium, <i>S. & E.</i>	
Clompanus, <i>Rmp</i>	Delabeehea, <i>Mtch.</i>	Firmiana, <i>Marsig.</i>	Covilhamia, <i>Krtl.</i>

GEOGRAPHICAL DISTRIBUTION.—Although the generality of this family are tropical plants, they are not all confined to these regions, some being found in Anstralia and the islands adjoining that continent. The Bombaceæ and Helicteræ are frequent in America, while the Stereulæ are confined to the Old World, and particularly to Africa, few being found in Asia.

PROPERTIES AND USES.—The properties of this family do not differ materially from those of the Mallow family. Their herbaceous parts and young shoots abound in mucilage, and the bark of some is bitter and astringent.

The Bombaceæ contain *Adansonia digitata*, the greatest vegetable wonder of the world. This immense tree is called *Goui*, and its fruit *Boui*, by the natives of Senegal, *Baobab* by the Egyptians, and by us the fruit is called *Monkey-bread* and *Ethiopian Sour Gourd*. It is a native of Senegal, Guinea, and the countries on the west coast of Africa, from the Niger to the kingdom of Benin. It is of moderate height, its trunk being not more than twelve or fifteen feet high before it divides into many horizontal branches, which are so large that each is equal to an enormous tree; they touch the ground at their extremities, being borne down by the dense foliage, and thus form an immense hemispherical mass of verdure from 120 to 150 feet in diameter, and perhaps sixty feet in height. At a distance, a full-grown tree almost presents the appearance of a forest, and it is said that Cape de Verd owes its name, in part, to the abundance of foliage which adorns the whole of Senegambia and Guinea with its green elliptical arches. Though low in height, the trunks of some of the largest trees measure from sixty-five to seventy-eight feet in circumference; and, in one instance, where a neighbouring river had carried away the soil from the roots, leaving a portion of them uncovered, they were found to measure 110 feet long, without including those parts which remained covered. The flowers are in proportion to the size of the tree, large, white, and pendent, and are followed by oblong fruit like a gourd, pointed at both ends, about ten inches long, five or six broad, and covered with a sort of greenish down, under which is a woody rind, hard, and almost black, marked with furrows which divide it lengthwise into ribs. The fruit hangs from the tree by a stalk two feet long and an inch in diameter.

The age of the Baobab is perhaps no less remarkable than its enormous size. M. Adanson relates that, in 1749, on a botanical excursion to the Magdalene Islands, he discovered, in the neighbourhood of Goree, some of these trees from five to six feet in diameter, on the bark of which were cut to a considerable depth several European names. Two of these names, which he repaired, were dated, one in the fourteenth and the other in the fifteenth

century. The letters were about six inches long, but in breadth they occupied only a very small portion of the circumference of the trunk; from which he concluded that they had not been cut when the trees were young. These inscriptions, however, he thinks sufficient to determine pretty nearly the age which these trees may attain; for even supposing that those in question were cut in their early years, and that the trees grew to the diameter of six feet in two centuries as the engraved letters evince, how many centuries must be requisite to give them a diameter of twenty-five feet, which perhaps is not the last term of their growth! The inscribed trees mentioned by M. Adanson had been seen in 1555, almost two centuries before, by Thevet, who mentions them in the relation of his voyage to "Terra Antartica." From the great age it attains, Humboldt has called it "the oldest organic monument of our planet." Founding his calculations on the proportionate growth of the trees, M. Adanson estimated the age of these trees to be as follow:—

1 year old is	1½	inch in diameter, and	5	feet in height.
20 do. .	1	foot do. . . .	15	do.
30 do. .	2	do. do. . . .	22	do.
100 do. .	4	do. do. . . .	29	do.
1000 do. .	14	do. do. . . .	58	do.
2400 do. .	18	do. do. . . .	64	do.
5150 do. .	30	do. do. . . .	73	do.

The Baobab is mucilaginous in its leaves and bark, and is used for a variety of economical and medicinal purposes.

The natives of Senegal dry the bark and leaves in the shade, and then reduce them to powder. This, which they preserve in bags of lincn or cotton, and call *Alo* or *Lalo*, they use every day, putting two or three pinches of it into their food for the purpose of keeping up a plentiful perspiration, but some writers say it is "for the purpose of diminishing the excessive perspiration to which they are subject in those climates." It has been found highly advantageous in the miasmatic diseases of the West Indies; and Dr. Duchassaing, of Guadaloupe, has published a statement of his experience with the bark, in which he states that out of ninety-three cases, chiefly of intermittent fever, he failed only in three; and M. Pierre has subsequently employed the remedy with success at Bourgogne. The bark has this advantage over Peruvian Bark, that it is almost without taste, and quite acceptable to the stomach. It produces no other observable physiological effect than some increase of appetite, increased perspiration, and perhaps diminished frequency of the pulse. These are facts relative to its medicinal properties which are at variance with those attributed to it by the quotation above. By the use of the powder M. Adanson preserved himself, during the five years he resided at Senegal, from the diarrhoea and fever which are so prevalent there. The bark yields a coarse fibre, which the natives convert into cords, and into a cloth with which they cover themselves from their middle down to the knees. The small leaves furnish them with food in times of scarcity, while the large ones are used as coverings to their houses. The fruit contains a whitish, spongy, juicy pulp, which envelopes seeds of a brown colour and shaped like a kidney bean. This farinaceous pulp has an agreeable acid flavour, tastes somewhat like gingerbread, and is eaten with or without sugar by the natives. At

Bangolo it forms the principal part of the food of the natives, who season many of their dishes with it, especially a kind of gruel made of corn, called *rooy*. It was the chief support of Major Pedley's expedition for ten or twelve days. When dried and powdered, the pulp is also used in dysentery and other bowel complaints. The juice expressed and mixed with sugar, or a syrup made of it, is used in putrid and pestilential fevers. When the fruit is decayed, it is burned by the natives, and the ashes being mixed with palm oil which has begun to turn rancid, serves the negroes as a substitute for soap.

The wood of the Baobab is spongy, soft, and light, and is of no use as timber. In Abyssinia the wild bees perforate it for the purpose of depositing their honey in the holes, which honey is reckoned the best in the country. On the eastern coast of Africa the tree is subject to the attack of a species of fungus, which vegetates in the woody part and renders the part so attacked very soft. The trunks of trees so affected become decayed and hollowed out into chambers, and within them the negroes place the bodies of their poets, musicians, and buffoons, whom they esteem greatly when living, but, supposing them to derive their superior talents from sorcery or intercourse with demons, they regard their bodies with a kind of horror when dead, and will not give them burial in the usual manner; neither suffer them to be put into the ground, nor thrown into the sea or river, because they imagine that the water would not then nourish the fish, nor the earth produce its fruit. The bodies thus shut up in these trunks become perfectly dry without decaying, and form a species of mummies without the help of embalment, and they are then known by the name of *guiriots*.

The cotton which is found on the seeds of *Chorisia speciosa* is used to stuff bolsters and pillows in Brazil, where it is called by the inhabitants *Arvore de Pana*; and that of the seed of the *Wool-Trees* (*Eriodendron*) is used for the same purpose. All the Wool-trees attain a great magnitude, but their wood is soft and spongy, and not adapted for commercial purposes. *E. anfractuosum*, which attains a height of 100 feet, yields a kind of gum which when combined with spices, is used in India for disorders of the bowels. The fruit is oval, and larger than a swan's egg, having a thick woody covering, and containing a quantity of short dark cotton, enclosing many roundish seeds, the size of peas, which are eaten by the inhabitants of the Celebes Islands. A variety of this, called *Africanum*, is the largest tree in Guinea, and its trunk is converted into very large canoes. Bosman says, he has seen in Guinea, trees of this kind extending their branches so widely, that 20,000 armed men might stand under the branches of one of them.

The *Silk-cotton Trees* (*Bombax*) are gigantic natives of the tropics of South America, Africa, India, and China, and are so called from a quantity of silky cotton which is found in their capsules or seed-vessels. The trunks of *B. ceiba* are prickly, and so large that canoes fit to carry a sail are made of them, by simply hollowing them out. In Columbus' first voyage it was reported that a canoe of this description was seen at Cuba, which was ninety-five palms long, of a proportionate width, and capable of containing 150 men; and it is stated that there are Silk-cotton trees existing in the West Indies which could not be compassed by 16 men, and so tall that an arrow

could not be shot to their tops. The canoes which are now made of this tree in the West Indies are capable of carrying a freight of fifteen or twenty hogsheads of sugar, weighing from six to twelve cwt. each, the average being about twenty-five tons burden. The wood is soft and spongy, but when cut into boards, and saturated with lime water, it will bear exposure to the weather for many years; it is also formed into laths for roofs, curing-pots, and hogshead headings. The tree grows abundantly about Canton, and is called *Moc-main* by the Chinese, and its wood is that which is chiefly used for the coffins of that vast population. These are made by cutting a butt the length of the dead body, and sawing off four slabs at right angles; the square centre is used for other purposes, and the four slabs are fastened together again to form this rude coffin. When the trunk decays, it becomes a nest for the *Macaca* beetle, the caterpillars of which, when gutted and fried, are esteemed by some as a great delicacy. The tree very much resembles in size and growth the largest walnut trees of England. Although a tropical plant, it sheds its leaves annually; and in March, before the young leaves appear, the tree comes into bloom, every twig of that great surface bearing a large tulip-like scarlet flower, which remains in perfection for a week or two, and is then succeeded by others from the sides. The short cottony substance which is found inside the capsules is used by the poor inhabitants of the countries where it grows for the purpose of stuffing pillows and chairs, but is generally considered unwholesome to lie on. The beautiful purple down of *B. villosum* is spun and woven into a cloth, of which garments are made, and worn by the inhabitants of New Spain; and it retains its fine purple colour without being dyed. *B. septenatum* is said to furnish the same kind of material. *B. pubescens* is called *Embirussu* in Brazil, from the bark, which is made into ropes, being so very tough.

The silky substance found in the capsules of the Silk-cottons has been tried by both spinners and hatters for their respective purposes, but it wants tenacity of fibre, and is therefore useless for the manufacture of any durable material.

The bark of the *Salmelias* is emetic; and the honey of the flowers of *S. malabarica* is said to be purgative and diuretic.

The *Durion*, or *Civet Durion* (*Durio zibethinus*), produces a fruit which is considered one of the most delicious of the Indian Archipelago. At first it is regarded with great repugnance, the fœtid odour which it yields being, it is said, almost intolerable; even the rind emits such an offensive smell that in Amboyna it is prohibited by law from being thrown near the public highways. The smell has been compared by some to decaying animal matter, and by others to rotten onions; but all who have experienced these agree in stating that, when once overcome, the fruit of the Durion is most enticing and delicious. The fruit is as large as a very large melon, and covered on the outside with soft spines, like the pod of a chestnut. The eatable part of it is that aril-like substance which contains the kernels, and which most resembles cream or blanchmange. It is called *duryovon* by the natives, who, when they have eaten too much, chew the betel to promote digestion. This fruit is said to be used as a bait to entrap the civet-cat, which is very fond of it, and hence its name. The *Hare's-foot Ochroma* (*O. lagopus*) contains in its capsules a fine, soft, mucous down, which inwrap

the seeds, and which is said to be employed in the manufacture of English beavers. Its wood is white, and so light that it is used instead of cork for fishing-nets by the fishermen of Jamaica; it is antisyphilitic, and the wounded bark exudes an abundance of an insipid clear gum, and contains a quantity of tough fibre which might be converted into ropes.

The flower of the *Hand-plant* of Mexico, *Cheirostemom platanoides*, Fig. 51 A, exhibits a singular conformation. It has no petals, but is furnished with a large angular calyx resembling a leathern cup, in the centre of which rises up a column formed of the united filaments, bearing five narrow anthers which are curved at the top, and with a curved style in the centre, the whole having the appearance of a hand.

The *Helicteræ* do not contain plants possessed of any peculiarities, or particular properties. The *Screw-trees* (*Helicteres*), so called from their seed-vessels being twisted in a spiral manner, are the only individuals yielding any virtues. The decoction of the root of *H. sarearolha* is used by the inhabitants of the mining districts of Brazil as an antisyphilitic, and is called by the natives *sarearolha*. It is supposed that its effects are attributable to the quantity of mucilage which it contains.

Stereulæ.—This tribe furnishes us with those plants which represent the type of the family, and from some of which is obtained a variety of Gum Tragacanth. They all contain a great quantity of mucilage. The seeds of a number of species of *Stereulia* are eaten. Those of *S. balanghas* are considered an esculent by the natives of Amboyna, who roast them for the purpose, and with the burnt capsules they make a pigment which they call *cassoumba*; those of *S. alata* are used by the natives of Siket as a substitute for opium, and those of *S. ehiea*, which are about the size of a pigeon's egg, and of an agreeable taste, are eaten by the inhabitants of Brazil, and are called *Chica*. The wood of *S. urens* is very soft and spongy, and is used for making the guitars of the Hindoos. The bark is exceedingly astringent, and tinges the saliva of a reddish colour; and the seeds, which taste like parched peas when roasted, are thus prepared and eaten by the natives of the Coromandel coast. From this tree, Roxburgh says that *Gum Kutera* is obtained; but Dr. Royle is of a different opinion (see page 79). *Gum Kutera* has some resemblance to Gum Tragacanth. It is in loose wrinkled drops or pieces, without taste or smell, and is for the most part transparent. In water it slowly forms a pulp or jelly, like Gum Tragacanth; but if pounded well in a mortar, and then boiled in water for fifteen minutes with constant agitation, it is said to be completely dissolved. A teaspoonful of its powder gives to water the consistence of capillaire. In India it is used in the composition of varnishes, and by calico printers; and it is an ingredient in a famous medicine for horses. Gum Kutera was about the beginning of the present century imported to this country in large quantities for the use of calico printers, but it was found to be greatly inferior to Gum Senegal, and its use was discontinued. The gum which is obtained from this tree is very much like Gum Tragacanth, and has been imported into this country under that name. From all its parts, except the wood, *S. foetida* emits a most disagreeable smell. The wood is of a pale colour, very durable, and does not crack. It is susceptible of a high polish, and being well varnished, is converted into handsome vases. The leaves, and the bark particularly, are aperient, diaphoretic, and

diuretic. The seeds are oily, and if swallowed in their raw state produce nausea and vertigo.

The *Cola* or *Kola* of tropical Africa is the seeds of *Sterculia acuminata*, which are held in high estimation by the natives of Guinea, who believe that by taking a portion of one of them before their meals it will improve the flavour of anything they may subsequently eat or drink. They are said to have been so highly estimated formerly by these people that fifty of them were sufficient to purchase a wife; but at present twenty or thirty seeds may be bought for a handful of cowries, while two or three tons of cowries would not now purchase a perfect woman. These seeds are about the size of a pigeon's egg, of a brownish colour, and very bitter taste, and are said to possess the same properties as Peruvian Bark. *S. tragacantha* furnishes *Senegal Gum Tragacanth*, which in its properties closely resembles the true article of that name. The seeds of all the species of *Sterculia* yield an oil which may be used for burning in lamps.



ORDER XXIX.—BYTTNERIACEÆ—THE CACAO FAMILY.

PLANTS composing this order are either annual or perennial trees, shrubs or undershrubs, rarely herbs; generally of an erect growth, but sometimes



Fig. 52. *Theobroma cacao*.

climbing; covered with star-like or forked hairs, rarely with scurf. *Leaves* alternate, simple, lobed, or toothed, furnished with leaflets at their base, which early fall off, and are rarely permanent, and occasionally wanting. *Flowers* hermaphrodite, regular. *Calyx* with four or five segments united at their base, sometimes naked, and at others with two leaflets behind them; always with a valvate aestivation, Fig. 50 A. *Corolla* with petals either equal in number to the segments of the calyx and alternating with them, and having a twisted aestivation, Fig. 49 C, or entirely wanting. *Stamens* either equal in number and opposite the petals; or double their number and the five alternate ones sterile; or a multiple of their number with the filaments united into a tube at their base, and rarely distinct; *Anthers* two-celled. *Ovary* free, with four, five, or ten cells, surmounted by as many distinct or united *Styles*, each terminated by a *Stigma*. *Fruit* a capsule, generally opening in one or few-seeded cells. *Seeds* round, sometimes winged, with a small quantity of fleshy or mucilaginous *Albumen*, which in some instances is wanting. *Embryo* straight or curved.

the petals; but when there are ten, five are sterile, and they are alternate with the fertile ones. *Anthers* incumbent with contiguous lobes. *Fruit* composed of five two-valved carpels, usually connected but sometimes nearly free. *Seeds* with a protuberance at their base. *Albumen* fleshy. *Embryo* straight.

TRIBE 1. *Lasiopetalæ*.—Calyx petal-like. Petals small, like scales, or wanting. Stamens free or united at the base, the five fertile ones opposite

GENERA AND SYNONYMES.

Seringia, Gay.
Gaya, Sp.
Guichenotia, Gay.
Thomasia, Gay.

Leucothamnus, Lindl.
Lasiopetalon, Sm.
Rhyncostemon, Steetz.

Corethrostylis, Endl.
Keraudrenia, Gay.
Sarotes, Lindl.

TRIBE 2. *Byttnerææ*.—Petals sessile or clawed, usually concave and arched at the base, but drawn out into a strap at the top. Stamens ten to thirty or more, divided into five or ten bundles, the sterile ones alternate with the petals, and the fertile opposite them. Ovary five-celled; cells two-seeded. Seeds sometimes without albumen, with thick cotyledons, sometimes albuminous, with leafy, flat, or convolute seed-leaves.

GENERA AND SYNONYMES.

<i>Rulingia</i> , <i>R. Br.</i>	<i>Hastingia</i> , <i>König.</i>	<i>Macarthuria</i> , <i>Endl.</i>	<i>Cacao</i> , <i>T.</i>
<i>Commersonia</i> , <i>Fst.</i>	<i>Byttneria</i> , <i>Léfl.</i>	<i>Ayenia</i> , <i>L.</i>	<i>Guazuma</i> , <i>Plum.</i>
? <i>Medusa</i> , <i>Lour.</i>	<i>Chætæa</i> , <i>Jacq.</i>	<i>Dayenia</i> , <i>Mill.</i>	<i>Bubroma</i> , <i>Schrab.</i>
<i>Jürgensia</i> , <i>Sp.</i>	<i>Heterophyllum</i> , [<i>Boj.</i>]	<i>Herrania</i> , <i>Gond.</i>	<i>Kleinhovia</i> , <i>L.</i>
<i>Abroma</i> , <i>Jacq.</i>		<i>Lightia</i> , <i>Schomb.</i>	<i>Actinophora</i> , <i>Wall.</i>
<i>Ambroma</i> , <i>L. f.</i>	<i>Telfairia</i> , <i>Newen.</i>	<i>Theobroma</i> , <i>L.</i>	<i>Pentaglottis</i> , <i>Wall.</i>

TRIBE 3. *Hermannææ*.—Calyx five-lobed, either naked or involucred. Petals flat. Stamens five, united at the base, all fertile and opposite the petals. Anthers ovate, two-celled. Fruit splitting by the backs of the carpels. Albumen fleshy, containing a curved embryo with an inferior ovate radicle, and flat leafy, entire seed-leaves.

GENERA AND SYNONYMES.

<i>Waltheria</i> , <i>L.</i>	<i>Melochia</i> , <i>L.</i>	<i>Altheria</i> , <i>Thours.</i>	<i>Hermannia</i> , <i>L.</i>
<i>Lophanthus</i> , <i>Frst.</i>	<i>Riedlia</i> , <i>Vent.</i>	<i>Lochenia</i> , <i>Arn.</i>	<i>Mahernia</i> , <i>L.</i>
<i>Astropus</i> , <i>Sp.</i>	<i>Riedleia</i> , <i>DC.</i>	<i>Physodium</i> , <i>Prest.</i>	

TRIBE 4. *Dombeyææ*.—Calyx five-lobed. Petals flat. Stamens fifteen to forty, united at the base, rarely all fertile; those that are sterile are either awl-shaped or strap-formed, and there are generally two or three fertile ones between each sterile one, more or less joined together. Styles three or five, either united or free. Two ovules in each cell. Fruit capsular, splitting by the edges of the carpels. Embryo straight in the axis of fleshy albumen, with twisted or flat bifid seed-leaves.

GENERA AND SYNONYMES.

<i>Ruizia</i> , <i>Car.</i>	<i>Melhania</i> , <i>Forsk.</i>	<i>Paulowilhelmia</i> , [<i>Hochst.</i>]	<i>Glossostemon</i> , <i>Desf.</i>
<i>Astyria</i> , <i>Lindl.</i>	<i>Cardiostegia</i> , <i>Prest.</i>		<i>Trochetia</i> , <i>DC.</i>
<i>Pentapetes</i> , <i>L.</i>	<i>Assonia</i> , <i>Cav.</i>	<i>Xeropetalum</i> , <i>Del.</i>	<i>Pterospermum</i> , [<i>Schr.</i>]
<i>Moranda</i> , <i>Seop.</i>	<i>Königia</i> , <i>Comm.</i>	<i>Leeuwenhoeckia</i> , [<i>E. Meyer.</i>]	<i>Velago</i> , <i>Gært.</i>
<i>Brotera</i> , <i>Car.</i>	<i>Vahlia</i> , <i>Dahl.</i>	<i>Astrapæa</i> , <i>Lindl.</i>	<i>Kydia</i> , <i>Roxb.</i>
<i>Sprengelia</i> , <i>Schit.</i>	<i>Dombeya</i> , <i>Cav.</i>	<i>Helsenbergia</i> , <i>Boj.</i>	
<i>Vialia</i> , <i>Vis.</i>			

TRIBE 5. *Eriolænææ*.—Calyx five-lobed, with a three or five-leaved involucre, which is distant from the flower. Petals flat. Stamens numerous, in several series, united into a tube, all fertile. Anthers two-celled erect.

GENERA AND SYNONYMES.

<i>Eriolæna</i> , <i>DC.</i>	<i>Jackia</i> , <i>Sp.</i>	<i>Aleurodendron</i> , [<i>Reinw.</i>]	<i>Exitelia</i> , <i>Blum.</i>
<i>Schillera</i> , <i>Reich.</i>	<i>Visenia</i> , <i>Houtt.</i>		<i>Maranthes</i> , <i>Blum.</i>
<i>Microkena</i> , <i>Wall.</i>	<i>Wisenia</i> , <i>G. Mel.</i>	<i>Glossospermum</i> , [<i>Wall.</i>]	<i>Philippodendron</i> <i>Pt</i>
<i>Wallichia</i> , <i>DC.</i>			

GEOGRAPHICAL DISTRIBUTION.—These inhabit the tropical regions of

the whole world, and are found at the Cape of Good Hope and in Australia. The *Lasiopetale* are confined to Australia, and particularly to the south-western part; the *Byttneræ* to Asia and America; the *Hermannæ* to the tropics of both hemispheres, and frequently at the Cape of Good Hope; the *Dombeyæ* to the cooler regions of Asia and Africa, and rarely in America; the *Eriolænæ* exclusively to Asia; and *Philippodendron* to New Zealand.

PROPERTIES AND USES.—The *Byttneræ* contain the *Chocolate Tree* (*Theobroma cacao*), Fig. 52, which grows naturally in South America and all parts between the tropics, but particularly in the Caraccas, Carthagera, the isthmus of Darien, Honduras, and Nicaragua. The tree grows with a bare stem six or seven feet high, and then throws out spreading branches attaining altogether a height of from twelve to sixteen feet. The fruit always grows from the trunk and the old branches; it is of a yellow or red colour, and in the form of an oblong-ovate deeply furrowed capsule, six or eight inches long and three in diameter, with a thick and rather woody rind; it is divided internally into five cells containing a whitish pulp of the consistence of butter, and of a sweet and agreeable acid taste, in which the seeds are embedded. This pulp, which is sucked and eaten raw by the natives, separates from the rind as the fruit attains maturity, and the ripeness of the fruit may be ascertained by shaking it, when it will make a rattling noise. The number of seeds in each fruit is about a hundred; they are of the size and shape of almonds, of a flesh-colour when fresh, and it is from these, when bruised, that the *Cacao** and *Chocolate* are obtained.

The *Cacao* delights in a moist and marshy soil, and hence it is found to grow in great perfection in the savannahs (which are wide plains covered with water) of Guayaquil, the Caraccas, and the Island of Trinidad; and in these parts it is cultivated with great assiduity. It requires an abundance of shade, and in the plantations where it is cultivated, one row of Plantain, Cassada, or Coral-bean Tree (*Erythrina umbrosa*), and two rows of *Cacao*, are planted alternately; and hence in forming a plantation these shade trees require to be planted some years before, that they may become sufficiently large to afford shade to the *Cacao* when sown; the seeds are sown two or three together, at distances of two yards apart in the rows, and when about a foot high, all are removed except the strongest plant. All the cultivation they require is to keep them free from weeds. A tree does not attain its full vigour for seven or eight years; when in full bearing it will produce from twenty to thirty fruit, two crops in a year, one in December and the other in June. The fruit is at first of a dark green colour, and dull red next the sun; but as they ripen, the green turns yellow and the dull red more bright and lively. They do not ripen all at once, but for three weeks or a month in the season; the overseers of the plantations go every day to cut those that are turned yellow. They are then laid in heaps till they have heated, and then they are opened by the hand, the seeds extracted, and spread out on mats in the sun to dry.

Before the Spaniards landed in America, the natives made a liquor

* By a corruption common to our language, *Cacao* has become changed into *Cocoa*, a name which belongs to the Palm that produces the cocoa nut, and is not only a different tree, but belongs to a widely different family.

with the seeds of Cacao diluted in water, which they seasoned with allspice coloured with annotta, and mixed with boiled maize-meal to increase its bulk; and this they called *chocolatt*, from which our word chocolate has come. Chocolate is prepared by first roasting the kernels of the seeds of Cacao in iron pans full of holes; they are then bruised and pounded, and freed from impurities; afterwards they are ground on a warm plate or slab, and made into a sort of oily paste, sugar being at the same time added in greater or less quantity. This paste the French flavour with spices, such as cinnamon, canella, vanilla, and cloves. It is then put into iron moulds and formed into cakes and rolls of various shapes. The chocolate used by the English has, or ought to have, rarely any other ingredient than sugar, and it is, as is well known, used in solution with hot water as a breakfast beverage. The Spaniards in making their chocolate, add to the Cacao, besides sugar and vanilla, pepper, cloves, cinnamon, anise, and even musk and ambergris. The Italians and the Spaniards roast their Cacao beans much more than either we or the French do, and hence their chocolate is of a darker colour, and more bitter.

Chocolate is very nourishing, but does not agree with all digestions. It is strengthening and well adapted to those who have been reduced by long disease or inordinate indulgence. In those with whom it agrees it speedily produces a sensible and reanimated amelioration of the forces. It has also been found beneficial to those suffering from consumption and other chronic diseases. Cacao-seeds bruised, and known in commerce as *Cacao-nibs*, boiled till their substance is extracted, will be found much better adapted for weak digestions than any other of these preparations. The same may be said of *Rock Cacao*, which is the beans simply reduced to a paste; but as this affords facilities for adulteration, the preferable form from which to obtain this excellent beverage is from the "nibs."

The seeds of Cacao contain a large quantity of soft solid oil, called *Cacao Butter*. It is yellowish white, of a sweet and agreeable taste, with a peculiar and pleasant odour, and is one of the most emollient oily substances known. It is much employed as a cosmetic and as a soothing medical application to sores and chaps, either on the breasts or other parts of the body. It contains a peculiar acid, which it yields when saponified; this acid has been called *cocinic acid*, and the oil *cocin*. It has also been found to contain several solid and volatile fatty acids; as caproic, caprylic, capric, and pichuric acids. A peculiar, crystallizable, azotised principle, called *Theobromin*, has been found in the seeds, which is said to contain a larger proportion of nitrogen than cafein. The shells of the seeds are sometimes used in decoction as a substitute for tea or coffee; their taste is rather bitter, and they have been regarded by some as a tonic.

There are many varieties of Cacao in commerce, which differ according to the countries from which they come; and there is very little which has not some mouldiness in the inside and a certain quantity of earth on the surface, which arises from its being buried in the earth for a month or six weeks that it may lose its acridity. The principal varieties are, 1. *Caraccas Cacao*, which comes from the coast of the Caraccas. It has been earthened, and it is that which gives it the dull grey exterior colour, and renders the husk easily separable from the kernel. It is large and round, violet coloured internally, and of an agreeable and sweet taste, but it is

apt to smell mouldy. 2. *Trinidad Cacao*, is brought from the island of that name. It also has been "earthed," but to a smaller extent than the preceding, and is generally smaller and flatter. 3. *Soconusco* or *Guetamala Cacao*, comes from the republic of that name, and is very large, not earthed, and of a clear brown colour in the interior, with a slight aroma, and is very highly esteemed. The other Cacaos are those of Para, St. Domingo, Martinique, &c. They are all generally small, flat, with the skin adherent, redder externally than internally, and of a more acrid and bitter flavour. They are only employed in the manufacture of common chocolate, and to mix with the superior varieties of Cacao; but, from their inferior price, they are better calculated for obtaining Cacao Butter.

The *Bastard Cedar* (*Guazuma ulmifolia*) of Jamaica grows in the lowlands of that and other West Indian islands. It affords an agreeable shade to the cattle from its wide-spreading branches and abundant foliage, and in dry weather it supplies them with food when the herbage is dried up. The leaves have the singular property of going to sleep, hanging quite down, while their footstalks remain quite erect and rigid. The seed-pods are filled with a mucilage which is very agreeable and has the taste of green figs. The wood is light and easily wrought, and is used by coach-builders for all the side pieces. A decoction of the inner bark is glutinous, like that of the elm, and in Martinique is used to clarify sugar, and the old as a sudorific. The bark of the young shoots abounds in a long and strong fibre. The bark of *Abroma augusta*, the *Ullat-kumu* of Bengal, abounds in a strong white fibre which makes a good substitute for hemp.

Hermanneæ.—This tribe does not include any plants of importance. The only one which possesses any known properties is *Waltheria durandinha*, a native of Brazil, on the banks of the Uruguay, where it is successfully used by the inhabitants in diseases of the chest, and in decoctions as an anti-syphilitic, or at least to allay inflammation in such diseases.



ORDER XXX.—TILIACEÆ—THE BAST-BARKS.

TREES and shrubs, rarely herbs, compose this family. They bear alternate, simple leaves, with leaflets at the base of the leaf-stalks. *Flowers* hermaphrodite, regular. *Calyx* with four to five segments, distinct, or more or less united at the base, and with the margins touching each other before opening, Fig. 50 A. *Corolla* with four to five petals, very rarely wanting. *Stamens* very often indefinite in number; very rarely double the number of the segments of the calyx; either distinct, or united in one or more bundles. *Anthers* opening by a longitudinal slit or by pores. *Ovary* free, with two to ten two or many-ovuled cells. *Styles* equal in number to those of the cells of the ovary, distinct or united. *Fruit* woody, capsular, rarely berry-like, one or many-celled. *Seed* with a fleshy albumen. *Embryo* with entire or palmate seed-leaves.

SUB-ORDER 1.—TILIEÆ.

Corolla either wanting, or, if present, the petals entire. Anthers opening longitudinally.

TRIBE 1. Sloaneæ.—Corolla wanting.

GENERA AND SYNONYMS.

Hasseltia, H. B. K.	Myriochaeta, DC.
Ablania, Aub.	Foveolaria, DC.
Trichocarpus, Schr.	Sloanea, L.
Dasynema, Schott.	Sloana, Plum.
Adenobasium, Prl.	

TRIBE 2. Grewiæ.—Corolla with the petals entire.

GENERA AND SYNONYMS.

Apeiba, Aubl.	Schlechtendalia,
Sloanea, Löffl.	[Sp.]
Aubletia, Schreb.	Heliocarpus, L.
Vantanca, Aubl.	Montia, Houst.
Lemniscia, Schrb.	Entela, R. Br.
Lühia, W.	Sparmannia, Th.
Brotera, Fl. Fl.	Clappertonia, Meisn.
Allegria, M. & S.	Honkenya, W.
Mollia, M. & Z.	Corchorus, L.

Cavictaria, Scop.	Tilia, L.
Corcta, DC.	Brownlowia, Roxb.
Murlensia, DC.	Humea, Roxb.
Corchoropsi, S. & Z.	Christiana, DC.
Triumfetta, Plum.	Grewia, Juss.

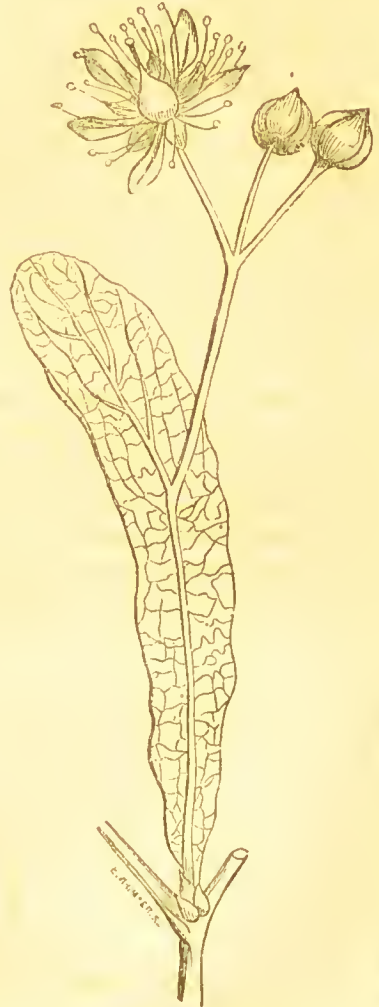


Fig. 53. Flower and bract of *Tilia Europea*.

„ Mallocoeca, <i>Forst</i>	Glyphæa, <i>Hook. f.</i>	Berrya, <i>Roxb.</i>	Trilix, <i>L.</i>
Chadara, <i>Forsk.</i>	Belotia, <i>A. Rich.</i>	Espera, <i>W.</i>	Jacquinia, <i>Mut.</i>
Siphomeris, <i>Boj.</i>	Diplophraetum, <i>Dsf</i>	Muntingia, <i>L.</i>	Bancroftia, <i>Macfad.</i>
Arsis, <i>Lour.</i>	Columbia, <i>Pers.</i>	Calabura, <i>Pluk.</i>	Aristotelia, <i>Herit.</i>
Vicentia, <i>Boj.</i>	Colona, <i>Cav.</i>		

SUB ORDER 2. — ELÆOCARPEÆ.

Corolla with cut or deeply fringed petals. Anthers opening by a transverse valve on the apex.

GENERA AND SYNONYMES.

Elæocarpus, <i>L.</i>	Monocera, <i>Jack.</i>	Anstrutheria, <i>Grd.</i>	Tricuspidaria, <i>R. &</i>
? Adenodus, <i>Lour</i>	Elæocarpus, <i>DC.</i>	Acronodia, <i>Bl.</i>	[<i>P.</i>
Lochneria, <i>Scop.</i>	Dicera, <i>Forst. p.</i>	Aerozus, <i>Sp.</i>	Tricuspis, <i>Pers.</i>
? Craspedum,	Beythea, <i>Endl.</i>	Vallea, <i>Mut.</i>	Crinodendron,
[<i>Lour.</i>	Friesia, <i>DC.</i>		[<i>Molin.</i>

GEOGRAPHICAL DISTRIBUTION.—The greater number of this family is found between the tropics; few are found in the temperate regions of the northern hemisphere.

PROPERTIES AND USES.—The whole family abounds in an insipid mucilage, and many of them are remarkable for the quantity of fibre which is yielded by their bark; the leaves of many are eatable, and the fruit of some are agreeably tasted and acid.

In the *Grewiæ* we meet with the plants of this family which are most remarkable for their properties and uses. The bark of *Lühea paniculata* is employed by the inhabitants of Brazil to tan leather, under the name of *acoeta cavalhos*, and the wood of *L. divaricata* for making wooden soles for shoes, and musket-stocks. The bark of all the species of *Apeiba* furnishes a strong and tough fibre which may be made into cordage. It is from two species of *Corchorus* that the Indian *Jute* is obtained, *C. olitorius* and *C. capsularis*. Both plants are very common in India, and the latter is cultivated both in Bengal and China for the fibre which it yields. This fibre is obtained by macerating the plant in water, and is used for cordage and even for making paper. It is from it that the “gunny bags,” which sugar and rice from India are brought over in, are made. *C. olitorius* is much used in the East as a pot-herb, and is called *Jew's Mallow*, from being so much cultivated and used by the Jews about Aleppo and other parts of Syria and Egypt. The bark of *Triumfetta semitriloba* is used in Jamaica for making strong ropes and cordage; and the leaves and buds infused in water yield a clear mucilage.

The plant with which we are best acquainted in this country belonging to this family is, the *Lime* or *Linden Tree* (*Tilia Europæa*), which forms such a beautiful object in our parks and pleasure grounds. It is from the bark of this tree that the *Bast mats*, annually imported from Russia, are obtained, and so well known among gardeners for packing, covering, and tying up plants. They are produced chiefly in the government of Vialka, Kostroma, and those adjoining, and are shipped at Archangel, Petersburg, and Riga. The trees which furnish Bast for the larger kinds of mats are those from eight to ten years old, or from six inches to a foot in diameter, cut down, when full of sap, in May and June. The bark is immediately

removed, generally in lengths of six or eight feet. It is then steeped in water till the bast comes off in separate layers; these are then selected and hung up to dry in the shade, and during the summer manufactured into mats. The Russian peasantry make matted shoes of this same bark, obtained from young shoots of three years' growth, and it requires from two to four of these young stems to every pair of shoes. Where the Lime abounds in this country, bast may be obtained from it equally as well as in Russia; the only course to be followed is, to remove the bark, and soak it in water till the mucilage is softened and the layers separate, when they may be hung up to dry and used at pleasure.

The wood of the Lime tree is light, soft, and close-grained, much used by turners, and for making the small wooden pill-boxes of the druggists. It is frequently employed for wood carvings, and it is said to have been with it that Gibbons executed those fine works of art which are to be found in the choir of St. Paul's, London; Trinity College Library, Cambridge; Chatsworth; and other places. The charcoal which it furnishes is esteemed by the makers of gunpowder as being superior to every other for their purpose. It possesses the properties of not warping or of being attacked by insects, and though so very close in the grain, does not blunt the tools which are employed upon it; hence it has been much used for cutting-boards by leather cutters. A cubic foot of the wood weighs 604 ounces, and its specific gravity is from '60 to '76, according to its state of dryness.

The flowers are fragrant and supply excellent pasturage for bees, and wherever the Lime tree abounds there bees are found to thrive. At Kowno, in Lithuania, there are immense forests of this tree, and it is from these that the celebrated *Kowno Honey* is gathered, and which is sold at more than double the price of any other, it being used extensively in medicine, and for mixing in liqueurs. The flowers are used medicinally in the state of infusion, and they are also distilled for the sake of the distilled water. These are said to be antispasmodic and slightly diaphoretic; the former is much esteemed in France as a popular remedy against coughs and hoarse-nesses. The Rev. Gilbert White says, "we made some tea of Lime blossoms, and found it a very soft, well-flavoured, pleasant, saccharine julep, in taste much resembling the juice of liquorice." The seeds of the Lime contain a quantity of fixed sweet oil, and from them a paste similar to cacao is obtained, but much inferior to it. In some countries the leaves are dried, and serve as winter food for cattle, particularly for sheep and goats. Cows eat them in the autumn, but they communicate a bad taste to the milk and butter. By making incisions in the trunk, the tree yields an abundance of sap, which by boiling and repeated clarification makes a sort of sugar.

It is said that the name of the family of the great Linnæus was derived from this tree—*Linn* being its Swedish name—an ancient Lime tree of great magnitude having grown near the residence of his ancestors.

Grewia didyma supplies a winter forage to cows, sheep, and goats in the Himalayas, the leaves being dried and stacked for that purpose; and the bark of *G. oppositifolia*, called *bihul*, yields a bast similar to that of the Lime tree, which is converted into mats, and used for ropes, by the inhabitants of these mountains. The berries of *G. sapida*, *asiatica*, and several other species, are, from their agreeable and pleasantly acid flavour, much

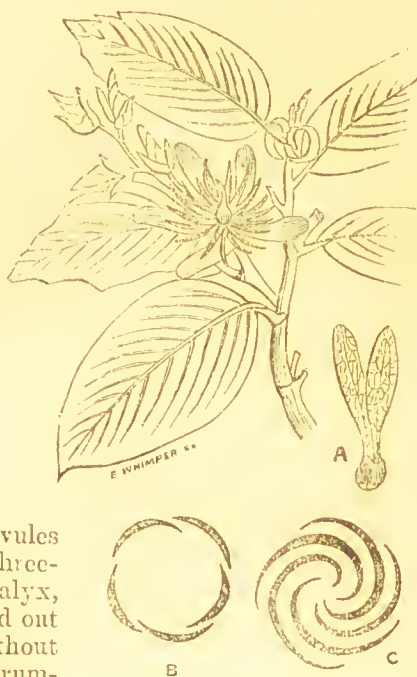
used in the East to mix in sherbets; and the wood of *G. elastica*, called *Dhamnoo*, is highly valued for making bows and the shafts of carriages, on account of its great strength and elasticity. *Berrya amomilla* is a native of Ceylon, and furnishes a light timber called *Trincomalee Wood*, of which the Massoola boats of Madras are built. The berries of *Aristotelia maqui* are perfectly black when ripe, agreeably acid, and eatable; and the Chilians make a wine from them, which they administer in malignant fevers. Dombey used it with success in Chili against the plague in 1782.

The *Elæocarpeæ* furnish a few plants to which a slight degree of interest is attached. Those round, carved-looking and rugged-furrowed, bony-like articles, which are used as necklaces and bracelets, and sometimes mounted in gold, are the fruit of the *Olive-nuts* (*Elæocarpus*) deprived of their fleshy part. The fruit of some of the species are used in Eastern curries, and also pickled, while some are eaten raw; such as those of *E. serrata*, which the inhabitants of Ceylon preserve in brine before they are ripe, and eat them with a little oil to give them a flavour. Rumphius says these fruits are good to eat, but the use of them is rather adapted for killing time than for any nourishment that can be obtained from them. The leaves of *Vallea cordifolia* yield a yellow dye.



ORDER XXXI.—DIPTEROCARPACEÆ—THE CAMPHOR TREES.

LARGE tropical trees, abounding in a resinous balsamic juice. *Leaves* alternate, entire, with numerous parallel veins running from the mid-rib to the margin, involute before expansion, Fig. 43 A, with leaflets at their base which quite envelop them before they expand, and which terminate the shoot with a tapering point, but they soon fall off after the leaves have opened. *Flowers* yellow or white, tinged with red, hermaphrodite. *Calyx* with five segments, united at the base, rarely free, either valvate, Fig. 50 E, or imbricate, Fig. B, before opening. *Petals* five, twisted before opening, Fig. C. *Stamens* indefinite in number, free, or a little connected at the base, sometimes in irregular bundles. *Filaments* widened at the base. *Anthers* erect, awl-shaped, two-celled, bursting at the apex by two pores. *Ovary* distinct, superior, three-celled; ovules in pairs. *Fruit* one-celled by abortion, three-valved, unopening, enveloped by the calyx, which has two of its segments lengthened out into two long wings, Fig. A. *Seeds* without albumen. *Embryo* with twisted and crumpled seed-leaves, and an inferior or superior radicle.

Fig. 54. *Dipterocarpus turbinatus*.

GENERA AND SYNONYMS.

<i>Dipterocarpus</i> , Gärt.	<i>Vateria</i> , L.	<i>Vatica</i> , L.
<i>Pterygium</i> , Corr.	<i>Seidlia</i> , Kostel.	<i>Shorca</i> , Roxb.
? <i>Caryobolis</i> , Gärt.	<i>Isaaxis</i> , Arn.	<i>Hopea</i> , Roxb.
<i>Dryobalanops</i> , Gärt. f.	<i>Retinodendron</i> , Korth.	<i>Lophira</i> , Banks.
<i>Anisoptera</i> , Korth.		

GEOGRAPHICAL DISTRIBUTION.—These are natives of the Indian Archipelago, where they form the largest forest trees. It is rarely that they extend into the continent.

PROPERTIES AND USES.—They all abound in a resinous balsamic juice, which becomes concrete, and forms resins of different kinds.

Dipterocarpus turbinatus, a native of India and the Malay islands, is celebrated in those parts for a liquid balsam which it yields, called in India *Gungun*, in Ceylon *Dhoongtil*, and by us *Wood Oil*, and which is much used for painting ships and houses. The mode by which it is obtained is to cut a large notch in the trunk of the tree near the ground, and to keep a fire round it till it is charred, soon after which the liquid begins to ooze out. *D. trinervis* yields a resin which is excellent for plaisters, and the

tincture or emulsion with yolk of an egg acts on the mucous membrane like Balsam of Copaiva. The Javanese smear the leaves of the Banana with this resin, converting them into torches, which burn with a pleasant odour and a white light.

Dryobalanops camphora yields the *Sumatra Camphor*. The tree is a native of Sumatra and Borneo, and the camphor is found in a solid state in cavities and fissures of the wood in the heart of the tree. It is much more valuable than the Common Official Camphor, which is obtained from *Laurus Camphora*. The tree of the Sumatra Camphor is very large, sometimes attaining the height of a hundred feet, with a trunk six or seven feet in diameter. The younger trees are generally less productive than the old, and the only way to ascertain whether a tree contains any of the product or not, is by incision. A person goes through the forests wounding trees as he goes along, and hundreds may be examined before the object is attained. When he comes to one which contains the camphor, it is felled and cut into logs, which are split and the camphor removed by sharp-pointed instruments; the masses are sometimes as thick as a man's arm, and from a foot to a foot and a half long. The trees which have been wounded and left standing often produce camphor seven or eight years afterwards. The same tree produces a pale yellow liquid, called in the East Indies *Oil of Camphor*, which is considered an excellent external application in rheumatism. It is found only in young trees, and is supposed to be the camphor before acquiring by age a concrete state. The whole tree is pervaded more or less with the camphor or the oil, and the wood retains a fragrant smell, and is highly esteemed for carpenter's work, being not subject to the attacks of insects. The camphor rarely comes to this country, it being absorbed by the Chinese, who, according to Mr. Reeves, estimate it at one hundred times more than the price of the ordinary camphor. It is more compact and brittle than common camphor, and though it will float in water at first, yet, when thoroughly moistened, it will sink. It is also less disposed to rise in vapour, and to crystallize on the inside of the bottle containing it.

Valeria indica furnishes the *Copal* of India. It is a large tree, eighty feet high, a native of Malabar, and called in the Bidinose country, *Dammer Tree*. The resin is obtained by wounding the tree, and is discharged in a clear pellucid state, fragrant, and with an acrid bitter taste; when dried it becomes yellow and brittle, like glass; but this is not the true Copal. When it exudes fresh from the tree, it is used in India as a varnish, called *Piney Varnish*, which is much esteemed, being hard and tenacious. It is made into candles on the coast of Malabar, which in burning diffuse an agreeable fragrance, give a clear bright light with little smoke, and consumes the wick so as not to require snuffing. Some of these candles were sent home to this country, and were highly prized; but the excessive duty charged upon them stopped the importation.

The wood of *Shorea robusta* is extensively used in the neighbourhood of Bengal for rafters and other economical purposes, and, though stronger than teak, is not so durable; it is nevertheless a valuable timber, and is called *Saul* in India. The tree yields large quantities of a resin which is used for pitch in the dockyards, and the best of it is burned in the temples as incense, under the name of *Ral* or *Dhoona*.

ORDER XXXII.—CHLENACEÆ—THE CLOAK-FLOWERS.

TREES and shrubs of small size, with showy flowers, which are generally red. *Leaves* alternate, entire, with veins running direct from the mid-rib to the margin, and furnished with leaflets at their base, which at first enclose the leaf-bud, but soon fall off after it opens. *Flowers* hermaphrodite, arranged in racemes, panicles, or corymbs, with a permanent involucre or envelope enclosing from one to two flowers, and hence the family is called Cloak-Flowers. *Calyx* small, with three segments, the margins of which overlap each other before opening, Fig. 54 B. *Petals* varying from five to six, broadest at the base, where they are sometimes united. *Stamens* sometimes ten, but generally indefinite in number, united by their filaments into a tube at the base, or adhering to the tube of the petals. *Anthers* roundish, two-celled, united or free. *Ovary* single, with three cells, surmounted by a single thread-like *Style*, which is terminated by a triple *Stigma*. *Fruit* a capsule with three cells, sometimes one-celled from abortion, each cell containing one or more seeds, which are fixed to the central axis, inverted and pendent. *Seeds* with fleshy or horny *Albumen*, containing a central, green *Embryo*, with wavy seed-leaves.

Fig. 55. *Sarcolena multiflora*.

GENERA.

Sarcolæna, Thou.
Leptolæna, Thou.

Schizolæna, Thou.
Rhodolæna, Thou.

These are all natives of Madagascar, and are not known to possess any properties or yield any products worthy of attention. They are all elegant shrubs from ten to twenty feet high, and are cultivated in stoves among botanical collections in this country. The genus *Rhodolæna*, which consists of but one species, is a beautiful climbing shrub with large scarlet flowers, well adapted for training over the rafters of a stove.



ORDER XXXIII.—TERNSTROMIACEÆ—THE TEA FAMILY.

THESE are all trees or shrubs, with alternate, simple *Leaves*, generally destitute of leaflets at their base; leathery and evergreen, or deciduous; with nerves which run straight from the mid-rib to the margin. *Flowers* hermaphrodite, but occasionally diceious, as in *Geeria*, regular. *Calyx* with from three to five unequal, concave, leathery, and permanent segments, often accompanied with two or more other leaflets at the base. *Corolla* with five petals, sometimes united at their base, and sometimes free. *Stamens* indefinite in number, either distinct or united into several bundles, and somewhat connected with the petals at the base; *filaments* short, awl-shaped; *anthers* erect, two to four-celled, opening longitudinally, and either connected or placed on a stalk and moving their position as if on a swivel. *Ovary* distinct, sessile, very rarely adherent to the calyx; with from two to five cells, each containing two or a greater number of pendent ovules, inserted at the inner angle; *Styles* equal in number to that of the cells, often united into one, each terminated by a simple *stigma*. *Fruit* a capsule, with two to five many-seeded cells. It is sometimes leathery, unopening, and a little fleshy internally, and at others dry, and opening in from two to five valves. *Seeds* often two, in each cell, without *albumen*, or with a very small quantity which is fleshy. *Embryo* arched, straight, or folded back, with oblong seed-leaves, a small plumule, and a long radicle, which is turned towards the hilum.

Fig. 56. *Thea viridis*.

GENERA AND SYNONYMES.

Anneslea, Wall.	Ampliania, Bks.	Erotium, Sol.	Kieseria, Nees.
Dicalyx, Lour.	Sarosanthra, Krth.	Lettsonia, R. & P.	Archytæa, M. & Z.
Sariava, Reinw.	Adinandra, Jack.	Ventenatia, Pal.	Ixonanthes, Jack.
Visnea, L. f.	Eurya, Thunb.	Microsemma, Lab.	Kielmeyera, M. & Z.
Mocanera, Juss.	Geeria, Blum.	Ploiarium, Korth.	Martineria, Fl. Fl.
Reinwardtia, Krth.	Cleyera, Thunb.	Laplacea, H. B. K.	Catostemma, Benth.
Ternströmia, Mut.	Hoseria, Seep.	Hæmocharis, Sal.	Oethocosmus, Benth.
Toanabo, Aubl.	Mukopf, Kämpf.	Wikströmia, Schr.	Cariapa, Aubl.
Tonabea, Juss.	Sukaki, Kämpf.	Lindleya, Nees.	Marila, Swartz.
Dupinia, Neck.	Freziera, Swartz.	Bonnetia, M. & Z.	Monoporina, JSP

Scyphæa, <i>C.B.P.</i>	Gordonia, <i>Ellis.</i>	Pentaphylax, <i>G. C.</i>	Thea, <i>L.</i>
Anisosticta, <i>Brtl.</i>	Lacathea, <i>Sal.</i>	Schima, <i>Reinw.</i>	Qüuna, <i>Aubl.</i>
Mahurea, <i>Aubl.</i>	Polyspora, <i>Swt.</i>	Pyrenaria, <i>Blum.</i>	Pœcilandra, <i>Tul.</i>
Bonnetia, <i>Schreb</i>	Carria, <i>Gard.</i>	Camellia, <i>L.</i>	Leucoxylon, <i>Bl.</i>
Stuartia, <i>Catesb.</i>			

GEOGRAPHICAL DISTRIBUTION.—The greatest portion of this family is found in South America, a few in North America; some in China, and the East Indies, and one only in Africa.

PROPERTIES AND USES.—The only plants of the whole family which merit any attention for their products are those producing Tea, and these are *Thea bohea* or *Black Tea*, and *Thea viridis* or *Green Tea*. Although these were at one time considered to be distinct, botanists are now somewhat unanimous in supposing them to be only different forms of the same species; and whereas it was supposed that the Black Tea of commerce was obtained from the former and Green Tea from the latter, I have been assured by Mr. Fortune that both sorts may be obtained from either variety, and that the only difference arises from the mode of manufacture. The Tea Tree is a shrub from three to six feet high, and is extensively cultivated all over China; but the situations in which it succeeds best are those on the sides or at the foot of mountains, and in valleys with a southern aspect to the sun. But although it delights in such an exposure to heat, it will also endure very low degrees of temperature, and may be successfully grown in the open air in any of the southern counties of England or Ireland. In the neighbourhood of London it frequently stands out the whole winter, and is not in the least injured by frost. When the Chinese make a new plantation it is by dropping the seeds into holes four or five inches deep at certain distances, two or three being put in each hole to ensure the growth of one. In three years the plant yields its first crop of leaves; and in seven or ten years, when it has acquired a considerable height, it is then cut down, and numerous young shoots issuing from the old stump produce a profusion of leaves, which yield a large product. The leaves are picked by hand, and three harvests are generally made throughout the year—the first at the end of February, the second at the beginning of April, and the third in June. The first collection is the most valuable, and consists only of the youngest leaves; the last, consisting of the oldest leaves, is comparatively little esteemed.

The difference between the manufacture of Black and Green Tea consists in the leaves undergoing a certain degree of fermentation for the former, before drying; and in those for the latter being directly submitted to a high temperature in iron pans—the popular belief that Green Tea is obtained by being dried in copper pans being quite a fallacy. In making Black Tea the process is not unlike that of making hay in this country. The leaves as soon as gathered are thrown together in a heap, and so left to undergo a certain degree of fermentation, by which they assume a dark colour, and become flaccid. This state being obtained, they are brought to the “twisters,” who, either by a peculiar twisting between the thumb and forefinger, cause them to assume the shrivelled appearance they have when they arrive in this country; or are thrown upon a table, made of split bamboo, and upon this uneven surface the leaves are rubbed and rolled by the hands till the twisting has been effected. From the twisters the leaves are con-

veyed to the drying room, where they are put into revolving cylinders of wicker work, and dried over small charcoal fires for the space of an hour, being stirred from time to time that the whole may receive the influence of the heat. They are again sent back to the twist-ers, who repeat their twisting operation; and after being sifted in a hair sieve to remove the fine dust, they are returned to the wicker cylinders, where, over a slower fire than the first, they are dried, this operation being performed three or even four times, till they become black and crisp. For Green Tea the leaves when gathered are taken directly, without undergoing any fermentation, and a few pounds thrown into iron pans, which are placed over small charcoal furnaces and heated to a certain degree. As they are thrown into the pan they crack with the heat; and it is the business of the attendant to keep stirring them with his bare hand till the whole mass is so hot as to be no longer endurable. They are then emptied down upon mats before the "rollers," who, taking small quantities at a time, roll them between the palms of their hands in one direction, or on the bamboo tables as the black tea, while others are fanning them that they may cool the sooner and retain their curl the longer. This operation is repeated two or three times, the degree of heat being redneed each time, and the process conducted more slowly and carefully. When perfectly dry and crisp, it is stowed away for use or for market.

The varieties of Black Tea are:—1. *Bohea*, which is in the form of a small blackish leaf, dusty, and of a somewhat brackish taste; it should be quite crisp, and that which smells faint and disagreeable should be rejected. 2. *Congou*, of this there are two sorts, *Campo Congou*, a superior kind of Bohea, with a larger and less dusty leaf with a fine flavour, and not unlike Souchong, and *Ankay Congou*, with a small wiry leaf and burnt smell; when fresh and first imported it has a high flavour, which it loses on the voyage. 3. *Souchong* is made from the leaves of trees three years old, and from older trees when they are grown in very rich soil; but there is very little of this variety made, that which comes to this country under that name being the first quality of Congou. In a plantation of tea trees one only may be good enough to be called Souchong; and of this only the best and youngest leaves are taken, all the others go to make Boheas and Congous. That which is sold for Souchong should be crisp and dry, and not broken, of a pleasant fragrant smell, and not old and musty, and as free from dust as possible. When infused in water, the leaves should be of a reddish-brown colour, and the infusion light brown; but sometimes it is dark and sometimes pale; but if good in other respects, as regards flavour, it should not be rejected because of the colour. Besides that just noticed there are two other varieties of Souchong:—*Caper Souchong*, is so called from being rolled up like a caper; it is of a fine black glossy colour, heavy, of a fragrant smell, and full high flavour, and yields an infusion of a bright reddish-brown colour. This should never be dusty, broken, or of a faint smell. It is said to be the very fine dust of other varieties rolled up with gum into the shape of capers. *Padre Souchong*, or *Powchong*, is a very superior variety of Souchong, with a fine taste, smell, and flavour. The leaves are larger, of a yellowish hue, and not so strongly twisted. This is very scarce, and difficult to be procured genuine. It should never be small and broken. 3. *Pekoe* is made from the tenderest leaves of three-year old plants, gathered after the plants have

been in bloom; they are collected just as the buds have burst and have made a shoot long enough to form a small sprig, and this is picked off. It has a downy or silky appearance, and is much employed for mixing with other teas, to which it communicates its peculiar flavour. The varieties of this are *Orange Pekoe*, which owes its peculiar perfume to the flowers of *Olea fragrans*. Every leaf is most beautifully and regularly twisted, and should never appear in fragments. *Flowery Pekoe* owes its perfume to the leaves or berries of *Chloranthus*, which communicate what is called the cowslip flavour. It is more highly esteemed than Souchong. 4. *Ball Tea* is a kind of black tea rolled up in balls the size of a nutmeg and gummed together.

Green Teas are also of several varieties. Those which are known in commerce are:—1. *Singlo*. This has a flattish leaf, and should have a fresh strong flavour, a light green colour when chewed, and on infusion none of the leaves should turn brown or dark coloured. That which is yellow, of a large loose leaf and dusty, should be rejected. 2. *Twankay*, is a superior kind of Singlo, and, like it, is of two or three qualities, the best being sometimes sold for hyson of inferior growth. It should be well twisted, and have a slight and pleasant burnt smell, and the infusion should yield a paler colour than singlo. That which is yellow, and has a smell somewhat like sulphur, should be rejected. 3. *Hyson Skin*. Of this there are two kinds, the common called *Bloom Tea*, and the *Superior Hyson Skin*. The former consists of the largest, worst coloured, irregular and uncurled leaves that are picked out from the best hyson. It yields a pale yellowish-green infusion, of a delicate taste, though somewhat of a burnt flavour. The latter is a nearer approach to true hyson, and is said to be that sort a year or more old which has been repeatedly dried and freshened up before being brought to market a second time. It is darker than hysons with less bloom on it; its smell is somewhat musty, and has more of the brassy flavour peculiar to green teas: it has not the delicate aromatic taste, and its infusion is darker, with less fragrance than the true hyson. 4. *Hyson*, is of a fine blooming appearance, very dry, full sized grain, and so crisp that it will crumble to dust with a slight pressure. The infusion should be of a light green colour, with an aromatic smell and strong pungent taste, and the leaf should open clear and smooth, without being broken or appearing shrivelled, this being an indication of old tea. The teas which appear of a dyed yellowish-green, or give the water a similar tinge, or rather a brownish hue, and those which appear highly glazed, which causes them to yield a high colour to water, should be avoided. 5. *Chulan Hyson*, has a yellowish leaf, a fragrant and perfumed smell, and the infusion has a strong flavour of cowslip. It is a variety of the preceding, distinguished by this cowslip flavour, which is communicated by having the berries of *Chloranthus*, a small shrub, called by the Chinese *Chulan*, mixed with it; and hence it is sometimes called *Cowslip Tea*. 6. *Gunpowder*, should be round like small shot, with a beautiful bloom upon it, which will not bear even the breath; with a greenish hue and a fragrant pungent taste. This kind of tea is frequently adulterated with an inferior kind, which is dyed and glazed to bear the appearance of the finest varieties, but which on infusion is very inferior in every respect. That which has the leaf open and loose, the face of a darker hue, and the taste brassy and unpleasant, should be carefully avoided.

There is a form of tea, called *Brush Tea*, which is made both of green and black. It consists in the leaves being twisted into small cords like pack-thread, about an inch and a half or two inches long, and tied in bundles at the ends with silk of various colours.

A spurious kind of tea called *Lie* by the Chinese, and very similar to Gunpowder, is much used for adulteration. It consists of the dust and sweepings of tea warehouses mixed with sand and other earth, and caused to adhere in granules by a sort of thin gruel made from the husks of rice being sprinkled upon it, and then stirred with rods till it acquires the desired form. The black variety of this is coloured with plumbago, and the green with the mixture employed in heightening the colour of the green teas.

It is a notorious fact that many of the Green Teas which are imported to this country and to the United States are coloured expressly to suit the tastes of the people of these two countries. A strange insatiation exists among many to use only those teas which are dyed in preference to those of a natural green colour. The Chinese never use these dyed teas themselves, and it is only those of inferior quality that are subjected to the operation. When Mr. Fortune was in China, he took some pains to ascertain the process by which the dyeing was performed. He says the operator first takes a portion of indigo and reduces it to powder in a mortar; then a quantity of gypsum, which has been subjected to calcination, and is well known by the name of Plaster of Paris, is also reduced to powder, and a mixture in the proportion of four parts gypsum and three parts indigo forms the colouring compound. When the leaves are undergoing the process of roasting in the iron pans, this colouring mixture is added, in the proportion of upwards of an ounce to 14½ pounds of leaves, and stirred among the leaves so that they may all be equally dyed. At this rate, Mr. Fortune observes, the Green-tea drinkers of Great Britain and the United States, for every 100 pounds of tea consumed, actually swallow more than half a pound of gypsum and indigo; and, what is worse, there is reason to believe that Prussian blue is sometimes used instead.

Tea is astringent and gently excitant, and in its finer varieties exerts an influence on the nervous system, producing feelings of comfort and exhilaration when taken in moderation; but when taken in excess for a long continuance, it will, in some constitutions, induce nervous and dyspeptic symptoms, the necessary consequences of over excitement of the brain and stomach. Tea may be given medicinally in diarrhoea, and a strong infusion has been known to remove nervous headaches. Green tea is much more injurious than Black, and should be avoided by all dyspeptics, and those whose nervous system is peculiarly excitable. This arises from the mode of preparation. Black tea undergoes a chemical change during the fermentation which takes place before it is roasted, but the Green is taken directly after being picked and dried in its natural state, and thus retains more of the natural narcotic properties of the plant unchanged than the Black; it also contains a larger quantity of the essential oil, which is considered highly poisonous, and a greater quantity of tannin.

The principle which acts on the nervous system is supposed to reside in the volatile oil, of which there is 0.79 in 100 parts of Green tea, and hence old teas from which the oil has evaporated are less energetic than those

recently imported; and it is said that the fresh leaves have often produced dangerous effects in China. Besides numerous other ingredients in its constitution, Tea contains a peculiar acid, called *Boheic Acid*, and a principle discovered by Oudry, called *Thein*, which has since been found to be the same in its composition as Caffein.

To this family the Camellias belong, and they bear a very close affinity to the Teas. They are now so common in this country as to have become quite a window-plant. Some of the species are perfectly hardy in some of the southern counties, and I know many specimens which have acquired quite the character of large trees, and annually produce a profusion of their beautiful flowers in the open air. The species which produces those numerous varieties which are continually appearing is *Camellia Japonica*.

The leaves of *C. sesanqua* dried in the shade yield a sweet smell, and the women of Japan wash their hair with a decoction of them; they are also used by the Japanese to communicate a perfume to their teas. *C. kissi* has very much the smell of tea, and the infusion of its leaves yields somewhat of the same flavour. From the seeds the Nepaulese extract an oil, which they much esteem in medicine. *C. oleifera* yields an oil which the Chinese employ in general use in their domestic economy, and with that extracted from the seed of *C. drupifera* the inhabitants of Cochin China anoint their hair, and apply to various medicinal purposes.

The leaves of *Kielmeyera speciosa* abound in a great quantity of mucilage, and are, on that account, useful in fomentations, for which they are employed by the Brazilians. The bark of *Gordonia* is used in the United States for the purposes of tanning leather.



ORDER XXXIV.—OLACACEÆ—THE OLAX FAMILY.

THESE, which formerly belonged to the Orange Family, are small trees or shrubs, with simple, alternate *Leaves*, without leaflets at their base. The *Flowers* are hermaphrodite, proceeding from the axils of the leaves. *Calyx* entire or slightly toothed, often attaining a large size, and becoming fleshy. *Corolla* composed of from three to six petals, which are leathery, sometimes free, and sometimes united in pairs at the base. *Stamens* from three to ten, several of them sometimes sterile and opposite the petals, while those that are fertile are alternate with them. *Ovary* free, one-celled, or occasionally imperfectly three to four-celled, generally containing three ovules, which are pendent at the top of the central column. *Style* distinct, thread-like, terminated by a very small three-lobed *stigma*, Fig. A. *Fruit* a berry, unopening, and one-seeded, enveloped by the calyx, which has become fleshy, Fig. B. *Seed* pendulous, with large fleshy *albumen*, containing a small *embryo* in its base, Fig. C.

Fig. 57. *Olax stricta*.

Agonandra, Miers.
Schöpfia, Wall.
Huénkia, R. & P.
Strombosia, Bl.
Anthesiandra, Mrs.

TRIBE 2. Icacinææ.

Icacina, A. Juss.
Apodytes, E. M.
Raphiostylis, Planch.
Leictia, Vell.

TRIBE 3. Sarcostigmææ.

Pennantia, Forst.
Stemonurus, Bl.
Lasianthera, P. de B.

TRIBE 1. Olacææ.

GENERA AND SYNONYMES.

<i>Opilia</i> , Roxb.	<i>Olax</i> , L.
<i>Groutea</i> , G. & P.	<i>Fissilia</i> , Comm.
<i>Ximenia</i> , Plum.	<i>Lopadostachys</i> , Klsh.
<i>Heynssoli</i> , Aub.	<i>Spermaxyrum</i> , Labill.
<i>Rottbœllia</i> , Scop.	<i>Roxburghia</i> , Kön.
<i>Tetanoxia</i> , Rich.	<i>Liriosma</i> , Pöpp.
<i>Heisteria</i> , L.	<i>Hypocarpus</i> , ADC
<i>Anacolosia</i> , Bl.	<i>Endusa</i> , Miers.
<i>Cathedra</i> , Miers.	<i>Iodina</i> , Hook.
<i>Diplocalyx</i> , Bnt.	<i>Arjoona</i> , Cav.
<i>Ptychopetalum</i> , Benth.	<i>Quinchamelium</i> , Juss.
<i>Rhaptostylum</i> , Kunth.	<i>Myoschilus</i> , R. & P.

GENERA AND SYNONYMES.

<i>Mappia</i> , Jacq.	<i>Poraqueiba</i> , Aub.
<i>Nothapodytes</i> , Bl.	<i>Meisteria</i> , Scop.
<i>Desmostachys</i> , Planch.	<i>Barreria</i> , W.

GENERA AND SYNONYMES.

<i>Gomphandra</i> , Wall.	<i>Sarcostigma</i> , W. & A.
<i>Platea</i> , Bl.	<i>Discophora</i> , Miers.
<i>Phlebocalymna</i> , Griff.	

TRIBE 4. Emmoteæ.

GENUS AND SYNONYME.

Emmotum, *Desv.*Pogopetalum, *Benth.*

DOUBTFUL OENERA.

Pseudaleia, *Thou.*Pseudalcoides, *Thou.*Quilesia, *Bl.*Lepionurus, *Bl.*Tripetaleia, *Sieb.*Parastemon, *A. DC.*Bursinopetalum, *Wight.*

GEOGRAPHICAL DISTRIBUTION.—These are found in the tropical regions of both hemispheres, in New Holland, and at the Cape of Good Hope.

PROPERTIES AND USES.—Very few of these are known to possess any properties. *Heisteria coccinea*, a native of Martinique, is called by the French inhabitants *Bois du Perdix*, because birds are fond of the fruit. The fruit of some species of *Xymeria* are eaten; that of *X. Americana* is the size of a pig on's egg, and of a somewhat acid, sweet taste; the flowers are very sweet scented. The wood of *Olax Zeylanica* is fœtid, with a saline taste, and is employed in putrid fevers; its leaves are used as a salad.



ORDER XXXV.—CYRILLACEÆ—THE CYRILLA FAMILY.

EVERGREEN shrubs, with alternate entire *Leaves*, without leaflets at their base. *Flowers* hermaphrodite, in terminal or lateral racemes. *Calyx* with five segments. *Petals* five, distinct, their margins overlapping each other before opening (æstivation imbricate, Fig. 54 B). *Stamens* five or ten, inserted with the petals; *filaments* spread out below the middle; *anthers* turned inwards, two-celled, opening lengthwise. *Ovary* free, from two to four-celled; *ovules* solitary, pendent. *Style* short, with as many lobes as there are cells of the ovary. *Fruit* either a fleshy capsule, two-celled, two-valved, two, or one-seeded by abortion, or a berry, four-winged, four-celled, and four-seeded. *Seeds* inverted. *Embryo* in the axis of an abundant fleshy *albumen*, and with a superior radicle.



Fig. 58.

GENERA AND SYNONYMES.

Cyrilla, <i>L.</i>	Walteriava, <i>Fraz.</i>
Cliftonia, <i>Sol.</i>	Elliotia, <i>Muhl.</i>
Mylocaryum, <i>W.</i>	Purdiea, <i>Planch.</i>

These are all natives of the southern states of North America, and are not known to possess any properties.



ORDER XXXVI.—AURANTIACEÆ—THE ORANGE FAMILY.

TREES and shrubs, always smooth and sometimes spinous. *Leaves* alternate and jointed above the stem, either simple, or sometimes compound, with one or many pairs of leaflets, the terminal one always standing on a winged, leafy, or widened footstalk; they are always filled with little vesicles of fragrant volatile oil, which is also found in great abundance in the flowers and the fruit. *Flowers* hermaphrodite, rarely unisexual, regular, and fragrant. *Calyx* pitcher-shaped or bell-shaped, with four or five lobes. *Corolla* with four or five petals, which are broadest at the base, and either free or united a little at the base. *Stamens* equal in number with the petals, or double, or a multiple of their number, either distinct or united by their base. *Ovary* free, with four, five, or many cells. *Style* always simple, short and thick, cylindrical or conical; *stigma* either simple or lobed. *Fruit* generally fleshy internally, separated by three membranous divisions into several cells containing one or more seeds inserted at their inner angle, and generally pendent. The rind of the fruit is filled with odoriferous volatile oil. *Seeds* without *albumen*, often containing many *embryos*.



Fig. 59. Citrus Limonium.

GENERA AND SYNONYMES.

Atalantia, <i>Corr.</i>	Bergera, <i>Kön.</i>	Achrotychia, <i>Forst</i>	Lavanga, <i>Meisn.</i>
Triphasia, <i>Lour.</i>	Murraya, <i>Kön.</i>	Clausena, <i>Burm.</i>	Feronia, <i>Corr.</i>
Limonia, <i>L.</i>	Chalcas, <i>Lour.</i>	Myaris, <i>Prest</i>	Ægle, <i>Corr.</i>
Winteria, <i>Denn.</i>	Marsana, <i>Sonn.</i>	Fragarastrum, <i>G.D.</i>	Belou, <i>Ad.</i>
Glycosmis, <i>Corr.</i>	Cookia, <i>Sonn.</i>	Micromelum, <i>Blum.</i>	Casimiroa, <i>L. & L.</i>
Sclerostylis, <i>Blum.</i>	Quinaria, <i>Lour.</i>	Paramignya, <i>Wight</i>	Citrus, <i>L.</i>
Rissoa, <i>Arn.</i>	? Aulacia, <i>Lour.</i>	Luvunga, <i>Hamilt.</i>	Papeda, <i>Hassk.</i>

DOUBTFUL GENERA.

Chionotria, *Jack.*Severinia, *Tenor.*

GEOGRAPHICAL DISTRIBUTION.—The Orange Family is chiefly confined to the East Indies, but has spread by cultivation throughout the tropical and ex-tropical regions of both hemispheres. Two or three are natives of Madagascar.

PROPERTIES AND USES.—The plants which compose this family are covered in all their parts with a multitude of small glands, which are filled with a volatile oil of a sweet and penetrating odour. It is found in the leaves, the calyx, in the petals, and in the thick exterior covering of the fruit. It is this volatile principle which makes the plants of this family so eminently fragrant, and which gives them that stimulant action which many of their parts exercise on the animal economy.

Atalantia monophylla, a native of the East Indies, is called by the Hindoos *Wild Lime*. The fruit is yellow, and about the size of a nutmeg; the wood is close-grained, hard, and heavy, of a pale yellow colour, and might be advantageously employed for cabinet work. The fruit of *Triphasia trifoliata* is about the size of a hazel-nut, with a very sweet, colourless pulp, with a slight taste of turpentine, but is considered very agreeable. The small black fruit of *Limonia crenulata* is used on the coast of Malabar as a medicine, and that of *L. acidissima*, which is the size of a nutmeg and excessively acid, the inhabitants of Java employ as a substitute for soap. The fruit of *Glycosmis citrifolia* is said to be delicious. *Bergera Königii* produces a fruit about the size and shape of a pigeon's egg, and of a yellow colour. Before it is ripe the pulp yields a white juice, which blackens the skin in the same way as the juice of walnut husks do; but when ripe the pulp is easily separated and has a grateful flavour, somewhat resembling that of white currants. The wood is hard and durable, and is used in the East Indies to make many implements of husbandry. Roxburgh says, that in the mountainous parts of the Circars it is cultivated in gardens for the sake of its leaves, which are used in cookery; that their flavour is peculiar, and at first disagreeable, but that most people soon become reconciled to, if not fond of it. The leaves are used medicinally as a stomachic and tonic, and its bark and root have stimulant virtues. The *Wampee*, a fruit highly esteemed in India and China, is the produce of *Cookia punctata*. The fruit of *Peronia elephantum*, called *Elephant Apple*, is about the size of one of our ordinary apples, and the pulp is universally eaten by the inhabitants on the Coromandel coast. The wood is white, hard, and durable; the leaves when bruised have a fragrant aroma like Anise, and are used in India as a stomachic and carminative. The tree yields a gum similar to Gum Arabic, which exudes from the stem when wounded, and is useful for mixing with painter's colours. The *Bengal Quince*, or *Marmelos* (*Egle marmelos*), produces a fruit larger than the preceding, of most delicious flavour, exquisite fragrance, and which is very nutritious. It contains a large quantity of exceedingly tenacious transparent mucus, which may be drawn out when fresh into fine threads two or three yards long, and which forms a good cement for some purposes. The fruit possesses an aperient quality, which is highly serviceable in cases of habitual costiveness; and from the rind the Dutch in Ceylon prepare a perfume. A decoction of the leaves is employed in asthma, and that of the root and bark is recommended in Malabar for hypochondriacal complaints, diseases of melancholy, and palpitation of the heart. The unripe fruit is prescribed in diarrhœa and

dysentery. The fruit of the *Hedge Benjal Quince* (*Æ. sepiera*) possesses a glutinous pulp of an ungrateful flavour, and laxative aperient properties; it is never eaten raw, but is cooked on hot ashes. The shrub is used in Japan for making hedges, for which its long, sharp, and stiff thorns particularly recommend it.

We come now to the consideration of, perhaps, the most universally popular of all fruits—the Orange Family, properly so called; and in doing so we shall begin first, in botanical order, with the *Citron* (*Citrus medica*), called by the French *Cedrat*. The citron is originally a native of the warm parts of Asia, but has for many centuries been cultivated in southern Europe. The fruit is frequently as much as six inches long, ovate, uneven on the surface, and with a protuberance at the top. It is nine-celled, with a white pulp, which is generally acid. It is seldom eaten without being preserved. The juice of the pulp is in such small quantity that no value is attached to it. It has the same properties as that of the Lemon, but is less acid, and has less perfume. Its rind is the part which is most in use, being preserved and candied in sugar, and kept during the whole of the winter and spring, to be used in many well-known ways in confectionery and domestic economy. The essential oil, which the rind contains in the small vesicles of its exterior, is extracted by expression, and is known by the name of *Huile de Cedrat*, or *Oil of Citron*. Mixed with sugar, it forms an oleo saccharum soluble in water, and is used to communicate the aroma to liqueurs. It is much used by confectioners and perfumers as an ingredient in confections and perfumes. The different varieties of Citron are:—1. *The Common Citron*, called in Italy *Petima*, and in France *Cedrat*, or *Citronier des Juifs*, because the Jews make use of it in the month of August for the Feast of Tabernacles. It is cultivated extensively at San Remo, San Steffano, and Taggia, in Genoa. 2. *The large fruited*, or *Genoa Citron*, does not differ materially from the preceding, except that it is very much larger, and its flesh is more coarse and less delicate, adhering closely to the rind, and considerably acid. It is a variety cultivated more for its beauty than for the use of confectioners for candying; it is produced principally at Taggia, San Remo, and Mentone. 3. *The Small Citron*, called by the French *Citronier de Salò*, and by the Italians *Cedrino*, is a very fine fruit, and much sought after for the aroma of the exterior rind, and the delicacy of the interior. It was found originally at Salò, on the Lake of Garda, where its cultivation is still extensively carried on, as well as at Nervi, Pegli, and Final. It differs from the Citron of Florence, in being more ovoid. 4. *The Citron of Florence* is of the size of an ordinary lemon, covered with tubercles, flat at the stalk end, and pointed at the other; it has a thin external skin of a clear yellow colour, and full of a delicious aroma. The inner rind is thick, white, very fine, and of an agreeable taste, and with it some of the most exquisite confections are made. It is principally cultivated in Tuscany. 5. *The Monstrous Citron* is of the size of the largest fruit, and receives its name from the inequality of its surface, which is covered with a great quantity of very prominent tubercles. The skin is of a pale orange colour; the interior is white, thick, and tough, and its pulp is thin, acid, and without seeds. This is cultivated in Liguria. 6. *The Sweet Citron* seems to be a hybrid between the citron and the orange, the fruit being the shape of the former and the colour of the latter; its rind is thick and delicate, and may be eaten with as much pleasure as that of

the citron, while its juice has a sweet and agreeable taste. This variety frequently encloses another perfect fruit in the inside of it. 7. *The Double-flowered Citron*, of which the flower is not exactly double, but semi-double. It produces monstrous fruit, containing a second fruit in their interior.

The *Lime*, or *Bergamotte*, is the fruit of *Citrus Limetta*, a tree closely resembling the Lemon tree, with small white flowers, but with a less penetrating odour. The fruit is pale yellow, roundish oval, with a protuberance like a nipple at the tip; the vesicles of the rind are flat or concave, and the pulp sweetish, vapid, or slightly bitter. The Limes appear to be a hybrid between the Lemon and the Orange. The varieties are:—1. The *Small Sweet Lime*, with fruit of a yellowish-green colour, roundish or depressed in shape, bearing the pistil at its extremity. The rind is smooth, and the pulp sweet. This variety is extensively cultivated in gardens. 2. The *Lemon Lime*, or *Sweet Lemon*, is larger than the preceding, of an oblong roundish shape, with protuberances at the point, which is in some cases also puckered. The rind is of a dark yellowish saffron colour, thick and insipid; but the pulp is extremely white, remarkably sweet, and very agreeable; there are a great many varieties of this in form, and in the degree of sweetness of the flesh. It is extensively cultivated in Liguria. 3. The *Bergamotte* is a small fruit, somewhat of a pear-shape, with a small protuberance at the tip. When ripe it acquires both the shape and colour of the lemon. Its bark is smooth and thin, containing an essential oil of a sweet and piquant fragrance which distinguishes this variety, and which is well known under the name of *Essence of Bergamot*. The pulp is acrid and bitter, and is not put to any use. The leaves have the same odour as the rind, and in the south of Europe the latter is employed to line boxes, for the purpose of communicating the perfume to the contents. It receives its name from being extensively grown in the neighbourhood of Bergamo, and not, as we observe some credulous writers saying, that it originated from a countryman grafting a citron on a bergamot pear! 4. The *Mela rosa*, or *Star-like Lime*, is a small flattened fruit, with a protuberance at the tip, and many raised ribs running lengthwise on the surface; the skin is thin, adhering closely to the pulp, of the colour of the lemon, and yields a sweet fragrance similar to that of the Bergamotte. The pulp is whitish and the juice acid. It is cultivated in Liguria, where it is known by the name of *Melaprosa*, from the fragrance of the fruit being supposed to resemble that of the rose. 5. *Adam's Apple*. This is sometimes, but very erroneously called the Shaddock, and botanists, beginning with Rumphius and Sloane, who were followed by Linnæus, have contributed towards this confusion. It is one of the oldest varieties known, and is mentioned in the early works of the Arabs, by whom it is called *Laysamou* or *Zambau*. From time immemorial it has been known throughout Italy as *Pomo d'Adam*; and in Liguria it is known by that and *pompoleon* and *decumano*. The French call it *Pomme d'Adam*. The fruit is four times the size of an ordinary orange, round, with a smooth skin like an orange, which is green at first, but changes to a pale yellow, thin and marked in many parts with slight cracks as if it had been bitten, from which circumstance it is called *Adam's Apple*. Under the outer rind, which is unsupportably bitter, there is an inner, thick, white, tough, and also bitter. The pulp is insipid, and the juice slightly acid. This is chiefly cultivated in Liguria by amateurs and nurserymen for

curiosity, as the fruit is of no use either eaten raw or preserved, its beauty being its only recommendation. 6. The *Small Naples Lime* is the produce of a dwarf tree. The fruit is the smallest of European lemons, and is round, bearing the pistil at the tip. The bark is yellow, smooth, extremely thin, and very fragrant; the pulp is abundant, with an acid juice remarkable for its agreeable aroma; this fruit is highly esteemed. There is a variety of it, round, not larger than a nut, and bearing the pistil at the top; it is red and covered with a very fine rind, which is scented like musk. The juice is acid, but agreeable. The *Limeira ambigua* of Brazil is a large and globular fruit, with a thin rind and very sweet pulp. There is also another variety cultivated at Bahia under the name *Limeira de Persia*, which has a very large fruit terminated by a point, with a bitter rind and sweet pulp.

The *Lemon* is the fruit of *Citrus Limonum*, Fig. 59, and of it there are many varieties. Some of the most important are:—1. The *Common Lemon*, which is met with so plentifully in commerce. It is generally of an oval shape, with a thick rind, which is sometimes smooth and sometimes rough, with an abundant, sour juice. This is the *Genoa Lemon*. 2. The *Thin-skinned Lemon*. This is a remarkably fine variety, of large size, and with a thin, smooth, shining, and fragrant rind, under which it is difficult to discern any white. The pulp is very delicate, and abounds in an agreeable acid juice, which has a delightful aroma. It is said to be only in the neighbourhood of Rome that it yields its fine aroma, and hence it is called *Lustrato*. 3. The *Sweet Lemon* has a sweet pulp, like an orange; but has all the exterior characters of the lemon. 4. The *Citron Lemon* is a large, oblong, warted fruit, with a rough rind, which is thick and eatable. It is one of the least delicate of the lemons, and is much cultivated in Liguria. There are numerous other varieties cultivated in the south of Europe; but as they are never seen in this country, we need not occupy our space with descriptions of them. The principal supplies of lemons received in this country are from Messina.

The *Orange* is the fruit of *Citrus Aurantium*, cultivated extensively in every region of the earth where the temperature is sufficiently warm to permit it to thrive. The supply which comes to this country is chiefly from Spain, Portugal, the Azores, and the Islands of the Mediterranean. The varieties generally imported are known by the names of *Lisbon*, *Malta*, and *St. Michael's*; and late in the season—in June—there have recently been arrivals of a very excellent variety from Valentia. Those which are included under the two first designations embrace very many varieties, of greater or less degrees of excellence; some of a very coarse character and acid flavour, and others sweet and agreeable. The *St. Michael's* is small and flattened at the ends, with a very smooth rind, the glands of which are very small, not prominent; the volatile oil which they contain is in much smaller quantity than is usually found in the other varieties, and the flesh is remarkable for its light-coloured pulp and delicious sugary flavour. The oranges above referred to, which are imported from Valentia, have very much of the same character; but those of the Peninsula and of Malta are generally large, with a thick, rough, spongy rind, prominent glands, and a great quantity of essential oil, while the pulp is small in comparison to the size of the fruit. A few of the varieties with which we become acquainted, through the annual importations, are:—1. The *Portugal* or *Lisbon*. This

is the most common of all, and is generally of a round shape, sometimes flattened, and sometimes a little elongated or oblong. The external rind is very thick, of a reddish yellow or deep orange colour, containing a good deal of aroma; and the interior is white, insipid, woolly, and light. The pulp contains a sweet and refreshing juice, which is extremely agreeable. As this reproduces itself from seed, there are a great many sub-varieties, varying in excellence. 2. The *China Orange* excels all the other varieties by the delicate flavour of its fruit, which has a most abundant and very sugary juice, with a fine perfume. The rind is always smooth, shining, and so thin that it is with difficulty it can be separated from the flesh. The St. Michael's would appear to be a variety of this. 3. The *Blood Orange*, sometimes called the *Malta Orange*, is a very singular variety: when it begins to ripen it is like a common orange; but, by-and-bye, flakes of red begin to appear in the flesh, and as the fruit advances towards maturity, they extend and become deeper in colour, till at last the whole becomes of a deep blood red, which extends its influence even upon the rind. The flesh is very sweet, but less so than that of the China Orange. It is very much cultivated in Malta and in Provence. 4. The *Egg Orange* is of a roundish, oval shape, a golden-yellow colour, and has a smooth rind. The juice is sweet and agreeable. 5. The *Tangerina Orange* is a small, flat fruit, with a pleasant perfume, and a sweet, agreeably-flavoured flesh.

The *Bitter, or Seville Orange*, is produced by *Citrus vulgaris*. These are called *Bigarade* by the French, and, like the others, there are a great number of varieties of them. This is well-known as the fruit which furnishes *Orange Marmalade*, and also the bitter principle of oranges, which, however, we shall speak of presently, when we come to notice the different properties of the family.

The *Shaddock*, is the fruit of *Citrus decumana*, and is called *Pampelmous* by the French. It is of an enormous size, frequently larger than a man's head, and weighing from ten to fourteen pounds weight. The rind is very smooth, of a greenish-yellow colour, thick, spongy, and bitter. The pulp varies in being both white and red, and the juice is of a sub-acid sweetness, and excellent for quenching thirst. From the thickness of its rind, it will keep longer at sea than any other of the orange species. It received its name from being first brought from China to the West Indies by a Captain Shaddock.

The *Forbidden Fruit, or Paradise Orange*, is produced by *Citrus paradisi*. It is a large pear-shaped fruit, of a greenish-yellow colour, with a well-tasted, very thick, tender rind, but hardly any pulp, and what there is, is very acid.

Besides those already mentioned, there are many others, such as the *Navel Orange* of Brazil, which is considered one of the best oranges in that country. It is large and round, with a protuberance at the tip, and hence its name. The rind is thin and smooth, and the flesh sweet and delicious. The *Mandarine, or Noble Orange*, is the fruit of *Citrus Nobilis*. It is red both without and within, and has a sweet juice and a sweet eatable rind. It is very much depressed in shape; the rind is thick, and attached so loosely to the flesh, that there is frequently a considerable space between them.

There are many uses to which the various parts of oranges are applied. The flowers distilled supply *Orange-flower Water*, a well-known perfume.

It is made extensively in Italy and in France, where the flowers of the Bitter Orange are employed for the purpose, as yielding the most fragrant products. They also furnish, by distillation, an oil called *Neroli*, much used in perfumery and in flavouring liqueurs. Small unripe oranges, the size of a cherry, are distilled, and yield, what is called by the French, *essence de petit grain*, and is used for the same purpose as the water distilled with the flowers. The oil, which now goes by that name, is, however, said to be obtained from the leaves, and those of the Bitter Orange yield the best. Orange peel has a grateful aromatic odour, and a warm, bitter taste, which depend upon the essential oil contained in its vesicles, and this oil may be obtained by simple expression of the fresh grated rind, or by distillation with water. Orange peel is a mild tonic, carminative, and stomachic. It is frequently used as an addition to bitter infusions and decoctions, as those of gentian, quassia, colombo, and particularly Peruvian bark. It is also candied and used by confectioners, and in domestic economy. The small variety called *aurago* is merely the young fruit of the Seville Orange, used for communicating that peculiar flavour and aroma to the liquor of that name. From the juice of the orange an excellent wine is made, and a simple beverage under the name of Orangeade. The young, unripe fruit are preserved whole in sugar, crystallised, and eaten as a sweetmeat.

The juice of the lemon is the part which is most valued, for its peculiar and grateful flavour, which is due to *citric acid*. It is cooling, and, when properly diluted, forms an agreeable and refreshing beverage in inflammatory diseases, under the name of *Lemonade*; or, added to other sick-room drinks, such as gum-water and barley-water. But the most important property it possesses is, the prevention and cure of scurvy, for which it is known by the name of *Lime Juice*; and, of late, drinking the pure expressed juice has been highly extolled as a remedy against severe attacks of acute rheumatism. The rind has a fragrant odour, is warm, aromatic, and bitter. It yields, by expression and distillation, an essential oil, called *Oil of Lemons*, which is much used for its flavour. The rind is also candied, like that of the orange, and is used for the same purpose.

The same remarks which have been applied to the Lemon are applicable also to the Citron.



ORDER XXXVII.—HYPERICACEÆ—THE ST. JOHN'S WORTS.

THIS family is composed of herbaceous plants, shrubs, under shrubs, and trees, containing a resinous juice. *Leaves* simple, entire, opposite, rarely



Fig. 60. *Hypericum oblongifolium*.

alternâte, full of pellucid and black dots, and without leaflets at their base. *Flowers* hermaphrodite, regular, generally yellow, but sometimes red or white. *Calyx* with five, rarely four segments, sometimes united at the base; the two outer ones smaller than the three inner ones. *Petals* of the

same number as the segments of the calyx, with a twisted æstivation, Fig. 49 c, sometimes filled with black dots, and occasionally with a fleshy scale or hollow at their base. *Stamens* indefinite in number, united at their base into from three to five bundles opposite the petals, and having sometimes fleshy glands between the bundles. *Ovary* free, globular, with three to four cells, rarely one, surmounted by several styles, which are sometimes united into one. *Fruit* either a dry or fleshy capsule of many valves and many cells. *Seeds* small, tapering, without *albumen*, and with a straight or curved embryo, having an inferior radicle.

TRIBE 1. *Hypericææ*.—Without glands between the stamens.

GENERA AND SYNONYMES.

Ascyrum, L.	„ Receveura, Fl. Fl.	Thymopsis, Jaub.	Eucryphia, Cav.
Hypericum, L.	Sarothra, L.	Adenotrias, Jaub.	Carpodontos, Lab.

TRIBE 2. *Elodeæ*.—Glands or scales alternate with the bundles of stamens.

GENERA AND SYNONYMES.

Parnassia, L.	Coapia, Piso.	Arongana, Pers.	Ancistrolobus, S.
Elodea, Adans.	Acrosanthus, Prl.	Hæmocarpus, Nor	Tridesmis, S.
Triadenium, Raf.	Psorospermum, S.	Elicia, Cambess.	Cratoxylon, Blum.
Martia, Sp.	Haronga, Thou.	Cussonia, Comm	Hornschuchia, Bl.
Vismia, Velloz.	Harongana, Lam.	Lanigerostemma,	
		[Chapel.]	

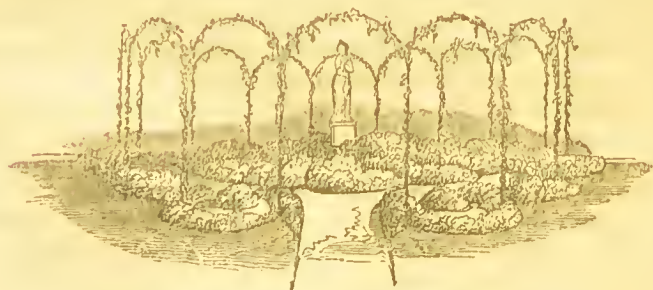
GEOGRAPHICAL DISTRIBUTION.—These are distributed over the whole surface of the globe, chiefly in temperate regions. They are most numerous in North America, not unfrequent in South America; not so numerous in Asia, and less so in Europe, and a few belong to Australia and Africa.

PROPERTIES AND USES.—These abound in a yellow resinous juice, which is usually purgative, anthelmintic. The resin which it contains communicates with alcohol and oils in which it is dissolved, and forms a more or less deep red colour; some of the family are milky.

It is principally in the *St. John's Worts* (*Hypericum*) that the properties reside. The common *St. John's Wort* (*H. perforatum*), when wounded in the slightest degree, yields the yellow resinous juice, and when rubbed between the fingers has a powerful lemon-like scent, and stains them of a dark purple colour, from the great quantity of essential oil, colouring matter, and tannin, which the plant contains. The plant has long possessed a reputation for considerable medicinal properties, but it is not admitted into the pharmacopœas, or recognised by regular practitioners. It has a bitter, resinous, and somewhat astringent taste; imparts a yellow colour to cold water, and reddens alcohol and the fixed oils. It has been used as a vulnerary, both externally and internally, and has been considered useful in hysteria, intermittent fevers, dysentery, hemorrhages, chest complaints, worms, and jaundice. Oil, in which the leaves and flowers have been macerated, is employed as a sovereign remedy for the healing of wounds and ulcers. The dried plant boiled with alum dyes wool yellow. In France and Germany the common people gather this plant with great ceremony on *St. John's day*, and hang it in their windows as a charm against storms, thunder, and evil spirits; and in North Wales, on the eve of *St. John Baptist's day*, the

people hang sprigs of it over their doors and windows for the same purpose. In Scotland it was formerly carried about the person as a charm against witchcraft and enchantment; and they fancy it cures ropy milk, which they suppose to be under some malignant influence, by milking afresh upon the herb. *H. calycinum*, an ornamental trailing shrub in pleasure-grounds and shrubberies, is known by the name of *Aaron's Beard* from its very long and spreading stamens. The leaves of *H. androsaemum* were formerly applied to fresh wounds, and called by the French *toute saine*, hence the origin of the English name *Tutsan*. A decoction of the leaves is used in the provinces of St. Paul and Minas Geraes, in Brazil, as an antidote to the bites of serpents; and that of *H. connatum*, which is astringent, is employed as a gargle for sore throat.

All the species of *Vismia*, or *Wax-Tree*, yield a viscid yellow juice when wounded, which becomes concrete and is somewhat similar to Gamboge. That which flows from *V. sessiliflora* is purgative in doses of seven or eight grains, and that of *V. guianensis* is known in commerce as *American Gamboge*, or *Gum Gutta*.



ORDER XXXVIII.—CLUSIACEÆ—THE BALSAM TREES.

TREES and shrubs, natives of the tropics, sometimes parasitical and climbing, with a yellow resinous juice. *Leaves*

opposite, rarely alternate, simple, without leaflets at the base. The *Flowers* are either hermaphrodite or unisexual, regular, very often terminal. *Calyx* with two, four, or eight segments, which are often coloured like petals, and either with or without bracteas.

Corolla with the same number of petals as there are segments of the calyx inserted on a fleshy disk or receptacle, sometimes angular, rarely lobed. *Stamens* indefinite in number, inserted with the petals; either distinct or united at the base in one or many bundles; *anthers* adhering, two-celled, rarely one-celled, bursting longitudinally, rarely by pores at the top.

Ovary simple, with one to eight cells. *Style* short, with a sessile, conical, and lobed *stigma*, Fig. A. *Fruit* sometimes dry and capsular, sometimes fleshy and berry-like, with many-seeded cells, rarely one-seeded. *Seeds* embedded in pulp, with a thin and membranous skin, always wingless, and usually arillate, without *albumen*. *Embryo* straight, with large, thick seed-leaves, which are united together.



Fig. 61. *Clusia flava*.

TRIBE 1. *Clusiæ*.—Ovary many-celled; ovules solitary or numerous. Fruit capsular, opening, many-celled.

GENERA AND SYNONYMES.

Tomovita, <i>Aub.</i>	Chrysochlamys, <i>Pöpp.</i>	Androstylium, <i>Mig</i>
Marialva, <i>Vand.</i>	Verticillaria, <i>R. & P.</i>	Quapoya, <i>Aubl.</i>
Marialvea, <i>Mart.</i>	Chloromyron, <i>Pers.</i>	Xanthe, <i>Schreb.</i>
Beauharnoisia, <i>R. & P.</i>	Havetia, <i>H. B. K.</i>	Clusia, <i>L.</i>
Micranthera, <i>Ch.</i>	Renggeria, <i>Meisn.</i>	Cochlanthera, <i>Choisy.</i>
Bertolonia, <i>Sp.</i>	Schweiggera, <i>Mart.</i>	Arrudea, <i>St. Hil.</i>
Ochrocarpus, <i>Thou.</i>	Rengifia, <i>Pöpp.</i>	Triplandron, <i>Benth.</i>

TRIBE 2. *Moronobæ*.—Ovary many-celled; ovaries numerous. Fruit a berry, unopening, many-celled; cells full of seeds.

GENERA AND SYNONYMES.

Chrysopia, <i>Noron.</i>	„ Blackstonia, <i>Scop.</i>
Moronoba, <i>Aubl.</i>	Aneuriscus, <i>Presl.</i>
Symphonia, <i>L. f.</i>	

TRIBE 3. *Garcinieæ*.—Ovary many-celled; ovules solitary. Fruit fleshy or a berry, unopening, one-seeded.

GENERA AND SYNONYMES.

Manmea, <i>L.</i>	Cambogia, <i>L.</i>	Pentadesma, <i>R. Br.</i>
Garcinia, <i>L.</i>	Hebradendron, <i>Grm.</i>	Gynotroches, <i>Bl.</i>
Mangostana, <i>Rumph.</i>	Xanthoehymus, <i>Rz.</i>	Platonia, <i>Mart.</i>
Oxycarpus, <i>Lour.</i>	Stalaguinites, <i>Mur.</i>	Discostigma, <i>Hassk.</i>
Brindonia, <i>Thou.</i>		

TRIBE 4. *Calophyllæ*.—Ovary two-celled and two-ovuled, or one-celled and one or three-ovuled. Fruit capsular or fleshy, one-celled and one to four-seeded.

GENERA AND SYNONYMES.

Mesua, <i>L.</i>	Calophyllum, <i>L.</i>	Kayea, <i>Wall.</i>
Rhyma, <i>Scop.</i>	Bintagor, <i>Rumph.</i>	Apoterium, <i>Bl.</i>
Nagassarium, <i>Rmp.</i>	Calysaccion, <i>Wight.</i>	

DOUBTFUL GENERA.

Rheedia, <i>L.</i>	Macanea, <i>Juss.</i>	Macoubea, <i>Aub</i>
Van Rheedia, <i>Pl.</i>	Macahanca, <i>Aub.</i>	Souala, <i>Blanc.</i>
Stelecho-permum, <i>Bl.</i>		

GEOGRAPHICAL DISTRIBUTION.—These are all tropical plants, and are more numerous in South America than in the Old World. A few are found in Asia and in Africa.

PROPERTIES AND USES.—While this family exhibits properties of an acid character, yet it furnishes fruits which are delicious and refreshing in the hot climates where they grow, and are considered the finest in the world; among which are the Mangosteen and the Mammee Apple.

In the *Cusiæ* we have *Tomovita fructipendula* producing fruit, which, when cut across, yields a viscid resinous juice, and whose bark is used by the inhabitants of Chicoplaya in Peru, both to dye fax of a reddish purple colour, and as a medicine. The *Balsam Trees (Clusia)* yield a

resin, that of *C. rosea* being used to cure sores in horses, and instead of tallow for covering boats. *C. Alba* is common in the woods of Martinico, where it is called *Aralie*. The juice is resinous and balsamic, at first of a greenish colour, but afterwards, on exposure to the air, becoming of a brownish red, and is used by the Caribbees for painting their boats. *C. flava*, Fig. 61, the *Yellow Balsam Tree*, is a native of Jamaica and other West Indian islands, where it is called *Fat Pork*, *Monkey Apple*, and *Mountain Mango*. This too yields a resinous juice, which is sometimes used among the negroes as a vulnerary, and was considered to be the *Hog Gum*, because it is said, that when any of the wild hogs are wounded, they repair to these trees and rub the wounded part against the stem, till they have anointed themselves with the juice, which heals them. The gum yields, when burned, an aromatic, agreeable odour. But there is a diversity of opinion among naturalists as to the identity of the tree which produces it. Dr. Bancroft says it is yielded by a tree allied to *Ochrocarpus* and *Garcinia*; Dr. Macfadyen states that it is obtained from *Moronobea coccinea*, and is the same as the *Mani* or *Oanani* of Brazil; while Dr. Hancock refers it to a totally different family, and ascribes it as the produce of *Rhus metopium*. Whatever it may be, it is largely used in the West Indies as pitch, and, in the form of pills, as a substitute for Balsam of Capivi. The flowers of *C. insignis* drop from their stamens and disk a great quantity of resin, which, rubbed down with cacao butter, the Brazilian women employ to relieve the pain of a sore breast. The resinous juice of *Moronobea coccinea* is used in Guiana and the West Indies by the Creoles, to tar their boats and ropes; and mixed with other resins of the country, they make flambeaux of it; with it the Caribbees attach the iron and the poison to their arrows.

The *Mammec Apple* is the fruit of *Mammea Americana*, a tall, handsome tree, sixty feet high, a native of the Caribbean islands and the neighbouring continent. It is round, somewhat three or four-angled, and the size of a man's double fist, covered with a leathery outer rind of a brownish-yellow colour, and a thin yellow inner one, which adheres closely to the flesh. The flesh is firm, bright yellow, with a singular and pleasant taste, and a sweet aromatic smell, but the skin and seeds are very bitter and resinous. On account of its yellow flesh it has been called the *Wild Apricot*; and the French call it *Abricot sauvage* and *Abricot de St. Domingue*. This is esteemed one of the finest fruits of the Indies, and ranks next to the Mangosteen. It is sold in the markets of the countries where it grows, and when eaten is cut into pieces and steeped in wine and sugar. With the pulp a delicious syrup is prepared, which preserves both the flavour and the odour of the fruit. The inhabitants of Martinique distil the flowers with spirits of wine, from which they obtain an excellent liqueur called *Eau Créole*, held by them in high estimation. The seeds of this fruit are anthelmintic; the tree abounds in a resinous gum; and from the fermented juice a wine is made. *M. Africana* produces a fruit similar to the above, both in size and flavour, and the tree also yields a resinous substance.

The *Mangosteen*, which is considered the richest and most wholesome fruit in the world, is produced by *Garcinia mangostana*. The tree is about twenty feet high, with flowers like those of a single rose, and leaves seven or eight inches long, of a shining green colour above, and olive green beneath.

The fruit is of the size and shape of an ordinary middle-sized orange, green at first, but as it ripens becoming of a dark brown colour, with yellow or grey spots on its surface. The rind is about a quarter of an inch thick, somewhat like that of the pomegranate, but more succulent; of a rose colour inside, and with a purple juice and an astringent taste. The pulp is divided into segments like that of the orange, but unequal in size, and not adhering to each other. The flesh is of a most delicious flavour, resembling a mixture of grapes and strawberries, and abounding in juice, which has a fine admixture of the sweet and the acid. "When eaten," says Thunberg, "the rind is generally pared off all round, and the pulp, which is white, soft, sweet, and inexpressibly delicious, is put whole into the mouth, in which it melts like whipped cream. It has a most pleasing mixture of acid, with a small degree of sweetness in it, which does not incommode the stomach, neither is one easily satiated with it." Each segment of the fruit contains a seed like an almond-kernel. Any quantity of the fruit may be eaten without inconvenience, and may be given without scruple to the sick, who, when they have no relish for any other food, eat this with great delight; but should they refuse it, their recovery is no longer expected. Dr. Solander, when in the last stage of a putrid fever at Batavia, found himself insensibly recovering by sucking this delicious and refreshing fruit. The dried bark is used with success in dysentery and tenesmus, and an infusion of it is esteemed a good gargle for a sore mouth or ulcers in the throat. The Chinese dyers use the bark as a mordant to fix a black colour. The Mangosteen is a native of the Molucca islands, and is cultivated in Java and several other islands of the Eastern Archipelago. The fruit of *G. cornea* is about the size of a plum, with a sort of wart at the tip; is filled with a mucous pulp, and has a resinous smell, but is inferior and not worth eating. The wood is so excessively heavy and hard as to give it the name of *Horny Garcinia*. It is used for the handles of tools; that of young trees for building, but the old is so hard that it cannot be converted to any purpose.

Xanthochymus pictorius produces a fruit like an orange, which is eaten by the natives of the Circars, and is not inferior to many apples. The fruit when full grown, but not ripe, yields a yellow, resinous, acrid gum, like gamboge, and of the consistence of rich cream. It makes a pretty good water-colour, either by itself, or in mixture with other colours to form green. It is imperfectly soluble in alcohol, and still less so in water; but the alkalis enable water to dissolve more of it. *X. cambogioides* also yields a resin like gamboge, which is used by painters, and is hardly distinguishable from it. *Garcinia cochinchinensis* also yields a yellow viscid juice, which has properties similar to Gamboge. The fruit is about the size of a plum, usually of a pear shape, and a reddish colour when ripe; the pulp juicy, and with the smell of an apple and an acid taste, and is eatable in a raw state.

Cambogia gutta is supposed to produce the *Gamboge* of commerce. It is a native of Malabar, Siam, Cambodia, and other parts of the East Indies; and is a large timber tree growing forty feet high. The fruit, which is two inches in diameter, is succulent, sweet, and eatable, and is much esteemed as a sharpener of the appetite, for which purpose it is eaten at meals as well as used as an ingredient in sauces. When the bark of the tree is wounded it discharges a great quantity of yellow viscid juice, which, when it becomes conerete, is said to be the gamboge of commerce. But there is some diver-

sity of opinion as to the plant, which really does supply the true gamboge, some naturalists attributing the productive property to this, and others to *Garcinia cochinchinensis*.

There are two forms in which gamboge is received in this country: one in the shape of hollow cylindrical rolls, and hence called *Pipe Gamboge*, and the other in large irregular masses, and called *Lump Gamboge*, or *Cake Gamboge*. The former, which is the most valuable, comes from Siam and Cochin China, and is said to be procured by breaking off the leaves and young shoots, from which the juice issues in drops, and after being received into suitable vessels, it gradually thickens and finally becomes solid, being previously rolled out into cylinders. Some of it is run into the hollow joints of the bamboo, and contracting round the sides during the process of concretion, leaves a hollow in the centre. The other variety is of a much coarser description, although derived from the same source. It is generally in large masses of two or three pounds or more, and is mixed with bits of stick and other impurities, and is probably the exudation from the wounded bark mixed with foreign substances for the purpose of adulteration.

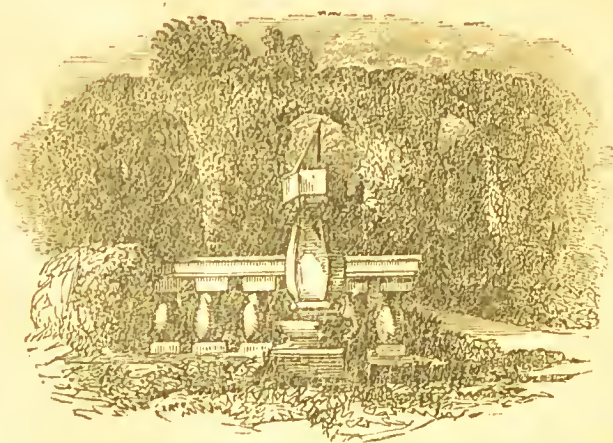
Gamboge was first brought to Europe in 1603 by the Dutch, under the name of *Gummi gutta*, but in Britain obtained the name of *Gamboge*, from coming from the province of Cambodia. In Malabar it is called *Careapuli*. It is a gum resin, and, unlike all other substances of the class to which it belongs, it does not contain any essential oil. In 100 parts of it, Braconnot found 19.5 of gum, 0.5 of impurities, and 80 of a red, insipid, resinous substance, becoming yellow by pulverisation, and supposed to consist of resin united with a reddish-yellow colouring principle, which is soluble in water and alcohol. Gamboge is a powerful drastic purgative, exercising an irritant action on the digestive organs, which sometimes causes vomiting; and in large quantities is capable of producing fatal effects, a dose of one drachm having resulted in death. It is generally prescribed in union with bitartrate of potass or jalap, in cases of dropsy attended with torpid bowels, and is often employed in cases of obstinate constipation, as well as in combination with mild cathartics the action of which is promoted and accelerated while its own is moderated. It has also been found beneficial in chronic affections of the skin, and in the expulsion of intestinal worms. Gamboge is also well known as a pigment, being largely employed in water-colour painting as constituting a very pure and fine yellow.

The *Butter-and-Tallow Tree* of Sierra Leone is *Pentadesma butyracea*, a tall tree, sixty feet high. The fruit is about the size of the Mammee Apple, but pointed at the apex, being conical in shape, and when cut open yields an abundant yellow, greasy juice, which has a strong turpentine flavour, and is mixed with their food by the natives. Mr. G. Don is of opinion that the "country butter" brought from the market of Freetown is obtained from this juice.

The flowers of the *Mesua*s are all fragrant. *M. ferrea* is much cultivated in Java and Amboyna for the beauty and fragrance of its flowers, while those of *M. speciosa*, which are of the size of Sweetbriar, are mixed, when dry, with other aromatics, such as white Sandal-wood, and used for perfuming ointment. The timber of both species is said to be very hard, and the bark, wood, and roots, to be bitter and sweet scented.

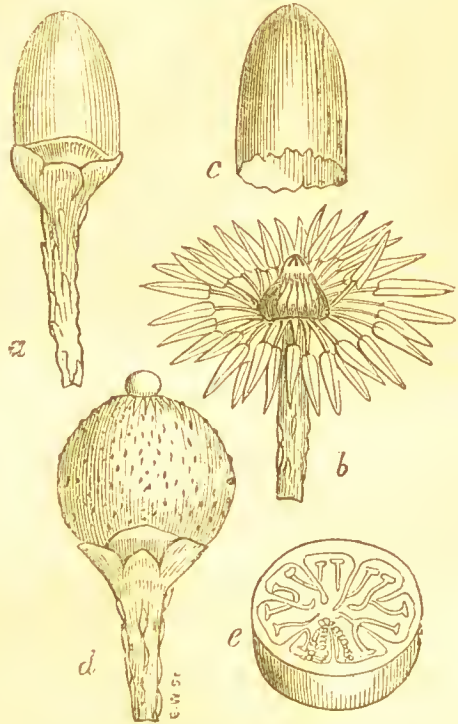
Calophyllum inophyllum produces a fruit the size of a walnut, with a

nut which is bitter, yielding a quantity of oil for burning in lamps, assuaging pain, and making ointments. A resin exudes from the roots and the bark when wounded, which hardens, and both are used medicinally. The wood is coarse-grained, strong, durable, and ornamental; and in Java the tree is planted about their houses for the elegance of the shade and the sweetness of the flowers. The *Tacamahaca* of the Isle of Bourbon is supposed by Guibourt to be the produce of *C. tacamahaca*. It is a soft, glutinous mass, solidifying on exposure to the air; of a dark bottle-green colour, and strong, unctuous odour, which, by exposure, becomes subdued and agreeable, resembling that of fenugreek. It dissolves imperfectly in cold alcohol, and more freely in boiling alcohol, on which a fat product floats, which is probably not natural to it. The nuts of *C. spectabile* are eatable, and the bark is manufactured into ropes; but those of *C. calaba*—a native of the Caribbee Islands—is not eatable, but furnishes an oil for burning in lamps and for domestic purposes. The timber, which is used for cask staves and headings, is said to be pretty good, but does not stand the weather well. The fruit of *C. spurium*, which is like the cornelian cherry, is eaten by the natives of Malabar, being sweet, mixed with acid; and an oil is also expressed from them.



ORDER XXXIX.—MARCRAVIACEÆ—THE MARCRAVIA FAMILY

SHRUBS which are frequently stem-rooting, erceeping, or climbing, compose this family. The *Leaves* are alternate, simple, entire, coriaceous, not deciduous, and without leaflets at their base. *Flowers* hermaphrodite, arranged in spikes or umbels, with frequently an irregular bractea, which is hollow, cowl-shaped, or like a horn, Fig. a, c. *Calyx* with from two to seven short, permanent segments, the margins of which overlap each other. *Corolla* entire, either rising like a kind of hood, Fig. c, or formed of five sessile petals. *Stamens* sometimes five, but usually numerous, with their filaments free, but widened at their base. *Ovary* distinct, globular, surmounted by a sessile, star-like stigma, which is rarely supported on a style. It has a single cell, Fig. e, which has from four to twelve partitions, divided at their free edge into two or three variously twisted laminæ, and all covered with very small ovules. *Fruit*, Fig. d, globular, leathery, but fleshy internally, unopening, or bursting irregularly into a certain number of valves, the bursting of which takes place towards the summit. *Seeds* very small and numerous, embedded in the pulp. *Embryo* without albumen, incurved, with very short, obtuse seed-leaves, and long, conical, acute, and inferior radicle, contiguous to and parallel with the hilum.

Fig. 62. *Marcgravia umbellata*

GENERA AND SYNONYMS.

<i>Ruyschia</i> , Jacq.	<i>Loghania</i> , Scop.	<i>Schwartzia</i> , Fl. Fl.
<i>Souroubea</i> , Aubl.	<i>Norantea</i> , Aubl.	<i>Marcgravia</i> , Plum.
<i>Surubea</i> , Mey.	<i>Ascium</i> , Schreb.	<i>Antholoma</i> , Lab.

GEOGRAPHICAL DISTRIBUTION.—These are all natives of tropical America, except *Antholoma*, which is indigenous to New Caledonia.

PROPERTIES AND USES.—The only plant of the family which is known to possess any properties is *Marcgravia umbellata*, Fig. 62, the root, stem, and leaves of which are supposed to possess diuretic and antisiphilitic virtues.

ORDER XL.—HIPPOCRATEACEÆ—THE HIPPOCRATEA FAMILY.

SMALL trees or shrubs, generally smooth, climbing, and stem-rooting

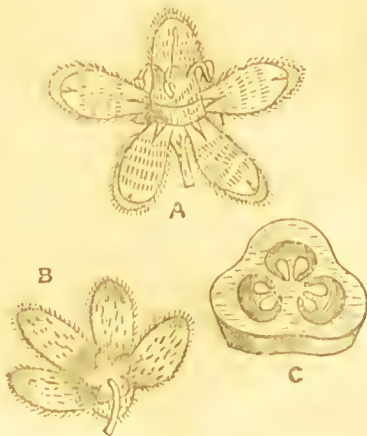


Fig. 63. *Hippocratea scandens*.

Leaves, opposite, simple, leathery, entire, or toothed, with small leaflets at their base, which early fall off. *Flowers* hermaphrodite, small, arranged in axillary spikes, or in corymbs. *Calyx* with five, rarely four or six, segments; permanent. *Corolla* with five petals, or equal in number to the segments of the calyx; somewhat imbricate in æstivation, Fig. 54 A. *Stamens* generally three, rarely five or ten, united by their widened filaments, and forming a tube at the base. *Anthers* one-celled, bursting transversely at the apex; or two or four-celled at the base. *Ovary*, Fig. C, in the tube of the stamens, three-sided, three-celled, free; each cell contains four ovules, attached to their inner angle. *Style* simple, terminated by one or three stigmas.

Fruit sometimes capsular, with three mem-

branous angles, sometimes fleshy; each cell generally contains four seeds. *Seeds* fixed by pairs to the central axis, erect, without albumen, often solitary from abortion. *Embryo* straight, with an inferior radicle pointing to the base, and flat, elliptic, and oblong fleshy seed-leaves.

GENERA AND SYNONYMES.

<i>Hippocratea</i> , L.	<i>Tontelca</i> , Aubl.	<i>Salacia</i> , Cambess	<i>Johnia</i> , Roxb.
<i>Coa</i> , Plum.	<i>Tonsella</i> , Schreb.	<i>Raddisia</i> , Leandr.	<i>Trigonotheca</i> , Hchst
<i>Bejuco</i> , Læffl.	<i>Sicelium</i> , P. Br.	<i>Clercia</i> , Fl. Fl.	<i>Diplesthes</i> , Harv.
<i>Daphnicon</i> , Pohl.	<i>Anthodon</i> , R. & P.	<i>Salacia</i> , L.	<i>Lacepedea</i> , H.B.K.
<i>Pereskia</i> , Fl. Fl.	<i>Anthodiscus</i> , Mrt	<i>Calypso</i> , Thouars	<i>Triceraia</i> , W.

GEOGRAPHICAL DISTRIBUTION.—The Hippocrateacea are found in the tropical parts of both hemispheres, and more frequently in America than in Asia and Africa.

PROPERTIES AND USES.—The fruit of *Salacia cochinchinensis* is of the size and shape of a pear, covered with imbricated scales, and is sold in the markets of Batavia; but is not eaten by Europeans. It is said to be nutritious and agreeable. That of *S. pyriformis* is eaten by the natives of Sierra Leone, and is sweeter and more richly flavoured than the preceding. The nuts of *Hippocratea cinnosa* are oily and sweet, and are called *Amandier du bois* in the West Indies; and several species of *Tontella* supply fruit, which is sweet, mucilaginous, and wholesome

ORDER XLI.—MALPIGHIACEÆ—BARBADOES CHERRY FAMILY.

TREES with a straight stem; or climbing shrubs. *Leaves* opposite, or in a whorl of three, sometimes alternate, with leaflets at the base, simple or compound, frequently furnished with glands on the leaf-stalk, and sometimes clothed on the under surface with tuberos-like hairs, which sting and cause a sharp smarting pain when touched. *Flowers* either hermaphrodite or unisexual, regular, yellow or white, forming racemes or corymbs, which are either terminal or issue from the axils of the leaves. *Calyx* with five more or less deeply divided segments, furnished with two glands at the base of each division. *Corolla*, which is sometimes wanting, with five petals and long claws, often fringed with hairs round the margin; imbricate in æstivation, Fig. 54 B, and alternating with the segments of the calyx. *Stamens* either double, or equal in number to the petals, rarely less; free, or united by the widened base of the filaments. *Ovary* simple, with two, three, or four cells, or composed of as many one-celled carpels, united together and rarely distinct. *Styles* three, distinct, or united in one. *Fruit* either dry or fleshy, composed of two or three one-seeded carpels, which are prolonged sometimes laterally, sometimes circularly into a membranous wing. *Seed* without albumen. *Embryo* more or less curved, or straight, with a short radicle, and leafy or fleshy seed-leaves.

TRIBE 1. Malpighiæ.—Styles three, either distinct or joined in one. Fruit fleshy, unopening. Leaves opposite.

GENERA AND SYNONYMES.

Malpighia, <i>Plum.</i>	Lophanthera, <i>A. J.</i>	Galphimia, <i>Cav.</i>	Malaemæa, <i>Gris.</i>
Byrsonima, <i>Rich.</i>	Pterandra, <i>A. J.</i>	Thryallis, <i>L.</i>	Echinopteris, <i>A. J.</i>
Burdichia, <i>A. J.</i>	Ephymæcalyx, <i>[Pohl.]</i>	Spachea, <i>A. de J.</i>	Dicella, <i>Gris.</i>
Coleostachys, <i>A. J.</i>		Meckelia, <i>Mart.</i>	Itcladraia, <i>A. J.</i>
Blepharandra, <i>Gris.</i>	Verrucularia, <i>A. J.</i>	Bunchosia, <i>Rich.</i>	Nitraria, <i>L.</i>



Fig. 64. Malpighia glabra.

TRIBE 2. *Hiptagææ*.—Style one. Carpels of the fruit dry, unopening, one-seeded, usually winged. Leaves opposite or whorled.

GENERA AND SYNONYMES.

<i>Hiptage</i> , Gärt.	<i>Tristellateia</i> , Thou.	<i>Jubelina</i> , A. J.	<i>Gaudichaudia</i> , Kth.
<i>Gürtnera</i> , Schreb.	<i>Zymum</i> , Nor.	<i>Dinemandra</i> , A. J.	<i>Camarea</i> , St. Hil.
<i>Molina</i> , Cav.	<i>Thryallis</i> , Mart.	<i>Dinemagonum</i> , A. J.	<i>Janusia</i> , A. J.
<i>Mudablota</i> , Son.	<i>Triaspis</i> , Burch.	<i>Aspicarpa</i> , Rich.	<i>Schwannia</i> , Endl.
<i>Succowia</i> , Den.	<i>Flabellaria</i> , Cav.	<i>Acosmus</i> , Desv.	<i>Fimbriaria</i> , St. H.

TRIBE 3. *Banistereææ*.—Styles three, distinct. Carpels of the fruit dry, unopening, one-seeded, variously expanded into wings. Leaves opposite, rarely whorled, or alternate.

GENERA AND SYNONYMES.

<i>Hirea</i> , Jacq.	<i>Diplopterys</i> , A. J.	<i>Rysepterys</i> , Bl.	<i>Tricomaria</i> , H. & A.
<i>Triopterys</i> , L.	<i>Lophopterys</i> , A. J.	<i>Banisteria</i> , L.	<i>Aeridocarpus</i> , Guil.
<i>Tetropterys</i> , Cav.	<i>Brachypterys</i> , A. J.	<i>Peixotoa</i> , A. J.	<i>Anomalopterys</i> ,
<i>Aspidopterys</i> , A. J.	<i>Stigmaphyllon</i> , A. J.	<i>Heteropterys</i> , Kth,	[G. Don.

DOUBTFUL GENERA.

Platynema, W. & A. | *Caucanthus*, Forsk | *Bombix*, Lour.

GEOGRAPHICAL DISTRIBUTION.—The greatest number of this family are found in the primæval forests of central America. They are not so common in Asia, and still more rare in Senegambia and the Cape of Good Hope.

PROPERTIES AND USES.—The wood and bark of this family seem to possess a colouring property, and the fruit is mucous and astringent, and many of them have the flavour of acid cherries. That of *Cowhage cherry* (*Malpighia urens*) is only eaten by children and negroes, and is quite insipid. The berries of *M. Setosa* were eaten in great quantities by Jacquin and his companions to quench their thirst while travelling under the heat of Martinico, and they suffered no inconvenience from them. The *True Barbadoes cherry* (*M. glabra*) produces a red fruit of the size of a cherry, which is succulent, and abounds in a sweet and agreeable juice. The tree is cultivated for its fruit in all the West India Islands and a great part of the mainland of South America. The *Sierra Leone Sugar-plum* is the fruit of *M. saccharina*, and is sold in great quantities in the markets of Freetown, during the months of February and March. They are about the size of a bullace plum, with an uneven, warted surface, and contain a sweet and agreeable pulp. The tree rises with a fine, clear stem, sixty feet high, and grows to the total height of eighty feet, forming a beautiful head, twenty feet high. The bark, of the genus *Brysonima*, is employed in Brazil, under the name of *Murici*, for tanning leather. A decoction of the roots and branches of *B. verbascifolia* is used as a detergent in ulcers, and as a vulnerary and an astringent. The wood is bright red. An infusion of the bark of *B. crassifolia* is used in Guiana as a febrifuge, and to stop vomiting; also as an antidote to the bite of the rattlesnake. The drug called *Alcornoque bark* is supposed to be furnished by several species of *Brysonima*, such as *B. coccolobæfolia*, *laurifolia*, and *rhopalæfolia*. It was introduced to Europe about fifty years ago, and, for a short time, attracted considerable attention

as a remedy in consumption of the lungs. It is in large thick pieces, composed of two layers, of which the external one is reddish, cracked, granular, spongy, and two or three lines in thickness; the internal, woody, and possessed of the property of imparting a yellow colour to the saliva, when chewed. It is inodorous. The outer layer is of an astringent, somewhat bitter, taste; the inner is considerably more bitter, and is decidedly emetic. The Alcornoque known in Spain is merely the bark of the cork-tree, and is sometimes confounded with that of South America. The berries of *B. spicata*, which are acid and astringent, are prescribed in dysentery. The fruit of *Bunchosia armeniaca*, which is like that of an apricot, is said to be poisonous. *Hiptage madablota* is cultivated all over the coast of Coromandel, on account of the beauty and fragrance of its flowers, each of which is composed of five petals, four of them white and one yellow.



ORDER XLII.—ERYTHROXYLACEÆ—THE RED-WOODS.

TREES or shrubs, with alternate or opposite *Leaves*, which are generally glabrous, and furnished with leaflets at the base of the leaf-stalk. *Flowers* small, white, or yellowish green. *Calyx* with five segments, united at the base, and permanent. *Corolla* with five petals, which are destitute of claws, broadest at the base, and each furnished with a scale on the inside, and their margins folded on themselves when in the bud. *Stamens* ten, united at the base, and forming a sort of tube, Fig. A. *Anthers* erect, two-celled, bursting lengthwise at the sides. *Ovary* one-celled, containing a single pendent ovule, or it has three cells, of which two are empty. *Styles* three, sometimes distinct, and sometimes united nearly at their summit, each crowned by a capitate *stigma*. *Fruit* a one-seeded cherry, Fig. B, containing an angular seed with fleshy *albumen*, which is sometimes wanting. *Embryo* straight, central, with linear, flat, leafy seed-leaves.

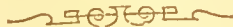
Fig. 65. *Erythroxylon laurifolium*.

GENUS AND SYNONYMES.

<i>Erythroxylon</i> , L.	,, <i>Stuedelia</i> , Spreng.
<i>Vennelia</i> , Commers.	
<i>Roelana</i> , Commers.	
	<i>Sethia</i> , Kunth.

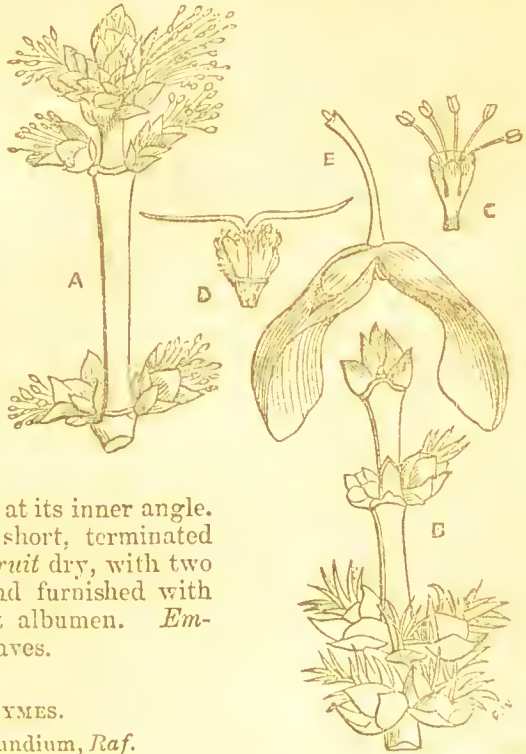
GEOGRAPHICAL DISTRIBUTION.—Chiefly found in the tropical regions of America; a few are found in the Mauritius, Madagascar, and the Indian Archipelago, and one in Australia.

PROPERTIES AND USES.—The wood of many of the species is of a reddish tinge, and from some a sort of dye is obtained, particularly from the bark of *Erythroxylon suberosum*, which the inhabitants of Minas Geraes call *Gallinha choco*, and *Mercurio do campo*. The leaves of *E. coca* are masticated with the seed of *Chenopodium quinoa*, and are said to stimulate the nervous system in the same way as opium, all the effects of which it possesses in a great degree.



ORDER XLIII.—ACERACEÆ—THE MAPLES.

TREES with watery, milky, or sugary sap. *Leaves* opposite, simple, entire, or deeply divided. *Flowers* hermaphrodite or unisexual, arranged in racemes or in corymbs, regular. *Calyx* with five, rarely four or nine deep segments, united at the base, with the margins overlapping each other before opening. *Corolla* with the same number of petals as there are segments of the calyx, inserted on the margin of the fleshy hypogynous disk, which occupies the whole bottom of the flower. *Stamens* eight, inserted in the hypogynous disk. *Ovary* twin and compressed, with two cells, each containing two ovules, attached at its inner angle. *Style* simple, sometimes very short, terminated by two awl-shaped stigmas. *Fruit* dry, with two one-seeded cells, unopening, and furnished with wings, Fig. E. *Seed* without albumen. *Embryo* with green plaited seed-leaves.



GENERA AND SYNONYMES.

<i>Acer</i> , L.	<i>Negundium</i> , Raf.
<i>Negundo</i> , Münch.	<i>Dobinea</i> , Hamilt.

Fig. 66. *Acer dasycarpum*.
A C. Male flowers; B D. Female ditto; E. Fruit.

GEOGRAPHICAL DISTRIBUTION.—These are all inhabitants of the temperate regions of the northern hemisphere, and particularly in North America and Northern India.

PROPERTIES AND USES.—The wood of almost all the species is useful for many purposes, especially to the cabinet-maker, the turner, the musical instrument maker; and for the manufacture of alkali, the maples of North America are of great value. The sap of all the species yields a considerable quantity of sugar.

Acer pseudo-platanus is the *Sycamore tree* of the English, and the *Plane-tree* of the Scotch. It is generally cultivated for its timber, and for ornament in parks and avenues. The wood is much used by turners for making bowls, wooden trenchers, and other domestic utensils; and by saddlers for saddlery-trees. It is soft, light, and tough, and though well adapted for agricultural implements, is surpassed for that purpose by the ash. In spring and autumn

this tree yields a great quantity of juice from sugar, and a good wine may be made.

Acer campestre, the *Field Maple*, also yields an excellent wood for turners and cabinet-makers. It is said to be much superior to the Beech, and when it abounds in knots is much valued for inlaying. It was much used for making musical instruments, such as violins, and, on account of its hardness, for gun-stocks. It was also in great request in former times for making tables. The *Norway Maple* (*Acer platanoides*) abounds in a sharp milky juice, which is repulsive to insects, as the leaves are seldom defaced by them; and it yields sugar in considerable quantity, as do also *A. rubrum* and *A. cricarpum*. But the species which produces that article in the greatest quantity, is the following.

Acer Saccharinum, or *Sugar Maple*, is a native of the rich valleys of North America, extending from Canada to Pennsylvania. It is a tree growing from forty to sixty feet high, and from two to five feet in diameter. The wood is very strong and of fine texture; but, being very inflammable, is not employed in building, but is chiefly used as fuel. It is from the old butts of this tree that the beautiful veneers called *Bird's-eye Maple* are cut; but, to procure this in the finest shadings of the grain, much skill is required in the cutting it up. The most important use to which the tree is applied is, to the supplying of sugar for the North American colonies. The way in which *Maple Sugar* is obtained is as follows:—In February or March, while the cold is still intense, the bole of the tree is bored with an augur in two places, five inches apart, at about twenty inches from the ground, and on the south side of the tree. Sometimes an incision is made with an axe, but the augur is the preferable instrument. The holes are made in an oblique, ascending direction, and should be somewhat more than half-an-inch in diameter, and to the depth of half-an-inch into the alburnum, or sap-wood; they are subsequently deepened to two inches. Into these holes tubes of sumach or elder, ten inches in length, are fixed, for the purpose of conveying the sap into troughs, placed below. Warm days and frosty nights are most favourable to the plentiful flow of the sap, and it will continue to flow pretty copiously for a month or six weeks, according to the temperature of the weather. Troughs are placed under the tubes to contain the sap, which is carried every day to a large receiver, from which it is conveyed, after being strained, to the boiler. Lime, eggs, or new milk, are added to the sap by way of clarifying it; but good, clear sugar may be made without having recourse to any of these ingredients. The sugar, after being sufficiently boiled, is grained, elayed, and refined in the same manner as cane-sugar in the West Indies. The sooner the sap is boiled the better, as it should never be kept more than twenty-four hours. There are three modes of converting the sap into sugar, viz., evaporation, freezing, and boiling, the last of which is the most general and rapid. Farmers have no other apparatus for conducting this process than one or two small iron kettles, and with these they will make 200 or 300 lbs. of sugar in the space of a fortnight or three weeks. There are other processes carried on, more scientifically and on a larger scale, by those who make it an article of commerce. Four gallons of sap yield about one pound of sugar, and from two to four pounds is the usual produce of a tree of the average dimensions, and growing upon average soils. The quality of Maple Sugar is superior to

that which is made in the West Indies from the cane; it deposits less sediment when dissolved in water, and has more the appearance of sugar-candy. During the sugar-making season, sheds are erected in the woods, for carrying on the boiling and other processes connected with the manufacture. Three workmen are allowed to attend on 250 trees, which give, on an average, 1000 lbs. of sugar. The profits of the Sugar Maple do not arise from the sugar alone; for it affords most agreeable molasses, and excellent vinegar. The sap, which is suitable for these purposes, is obtained after that which supplies the sugar has ceased to flow.

In Pennsylvania the timber of *Acer rubrum* or *Swamp Maple* is used for all kinds of wood-work; with the bark they dye a dark blue, and make a good black ink. The Canadians tap it for the juice, of which they make sugar and molasses.



ORDER XLIV.—SAPINDACEÆ—THE SOAP-BERRY FAMILY.

THE plants of this family are large trees or shrubs, and sometimes herbaceous, with a twining stem. *Leaves* alternate or opposite, simple, but generally compound, sometimes furnished with tendrils, and without leaflets at the base of the foot-stalks. *Flowers* hermaphrodite, or unisexual, regular or irregular. *Calyx* with five unequal segments, which are sometimes distinct or more or less united. *Corolla* with four or five petals, alternating with the segments of the calyx; inserted in a round, fleshy, glandular disk, with glands opposite the petals, and each petal furnished on the inside with a scale, or a tuft of hair instead. *Stamens* double the number of the petals, sometimes inserted in the disk, and sometimes between the glands and the pistil; the *filaments* are either free or united at their base; *anthers* bursting lengthwise. *Ovary* free, three-celled, rarely two to four-celled, each cell containing one, rarely two or four ovules. *Style* either simple or more or less deeply three-cleft. *Fruit* capsular, two or three-valved, and either woody, membranous, or fleshy, often furnished with a wing; but sometimes a berry, and unopening. *Seeds* usually furnished with an aril, and having a large *embryo* with its radicle curved over the seed-leaves, and destitute of *albumen*.

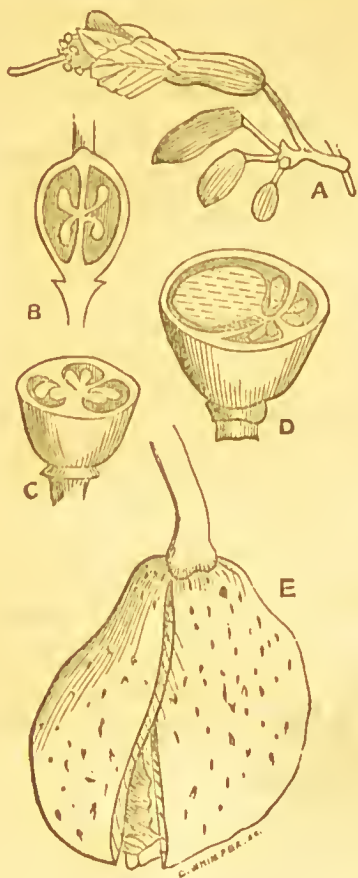


Fig. 67 *Pavia rubra*. A, the flower; B, vertical section of ovary; C, horizontal ditto; D, section of fruit; E, ripe fruit.

former has arranged them in his *Enchiridion* under the same order, it has been deemed desirable to follow the same course here also. We have, therefore, arranged them as tribes of the order Sapindaceæ.

TRIBE 1. *Sapindæ*.—Ovary containing one ovule in each cell. Embryo curved, rarely straight. Leaves alternate.

GENERA AND SYNONYMES.

<i>Cardiospermum</i> , L.	<i>Serjania</i> , Plum.	<i>Bridgesia</i> , Bert.	<i>Semarillaria</i> , R.
<i>Corindum</i> , T.	<i>Seriana</i> , Schum.	<i>Tripterocarpus</i> ,	[§ P.
<i>Erythrophila</i> , E. M.	<i>Toulcia</i> , Aubl.	[<i>Meisn.</i>	<i>Cururu</i> , Plum.
<i>Urvillea</i> , H. B. K.	<i>Ponaea</i> , Schreb.	<i>Paullinia</i> , L.	<i>Enourca</i> , Aubl.

Nattalia, <i>Hochst.</i>	Cupania, <i>Plum.</i>	Aphania, <i>Bl.</i>	Lecaniodiscus,
Schmidelia, <i>L.</i>	Trigonis, <i>Jacq.</i>	Talisia, <i>Aubl.</i>	[<i>Planch.</i>
Allophyllus, <i>L.</i>	Vouarana, <i>Aubl.</i>	Aeladodea, <i>R.P.</i>	Macphersonia, <i>Bl.</i>
Ornitrophe, <i>Juss.</i>	Molinæa, <i>Juss.</i>	Nephelium, <i>L.</i>	Jagera, <i>Bl.</i>
Toxicodendron,	Gelonium, <i>Gärt.</i>	Euphoria, <i>Com.</i>	Scorodendron, <i>Bl.</i>
[<i>Grt.</i>	Tina, <i>R. & S.</i>	Scytalia, <i>Gärt.</i>	Zygolepis, <i>Turcz.</i>
Aporetica, <i>Forst.</i>	Stadmannia, <i>Lam.</i>	Dimocarpus, <i>Lour.</i>	Hemigyrosa, <i>Bl.</i>
Gemella, <i>Lour.</i>	Mischocarpus, <i>Bl.</i>	Pometia, <i>Forst.</i>	Dietyoneura, <i>Bl.</i>
Usubis, <i>Burm.</i>	Guioa, <i>Cav.</i>	Li-tchi, <i>Son.</i>	Otonychium, <i>Bl.</i>
Nassavia, <i>Fl. Fl.</i>	Blighia, <i>Kœnig.</i>	Thouinia, <i>Poit.</i>	Blancoa, <i>Bl.</i>
Valenzuelia, <i>Bert.</i>	Akeesia, <i>Tuss.</i>	Thyana, <i>Hamilt.</i>	Schieckia, <i>Karsk.</i>
Irina, <i>Blum.</i>	Harpulia, <i>Rox.</i>	? Vargasia, <i>Bert.</i>	Lepidopetalon, <i>Bl.</i>
Prostea, <i>Camb.</i>	Bonnania, <i>Raf.</i>	Hypelate, <i>P. Br.</i>	Arytera, <i>Bl.</i>
Lepisanthes, <i>Blum.</i>	Dimcreza, <i>Lab.</i>	Sphaerococca, <i>DC.</i>	Spanoghea, <i>Bl.</i>
Sapindus, <i>L.</i>	Diplopetalon, <i>Sp.</i>	Exothea, <i>Macf.</i>	Otolepis, <i>Turcz.</i>
Pappea, <i>Eckl.</i>	Ratonia, <i>DC.</i>	Melicocca, <i>L.</i>	Lachnometalum,
Erioglossum, <i>Blum.</i>	Erioglossum, <i>G.</i>	Oococca, <i>DC.</i>	[<i>Turcz.</i>
Matayba, <i>Aubl.</i>	[<i>& P.</i>	Casimira, <i>Scop.</i>	Cubilia, <i>Bl.</i>
Ephielis, <i>Schreb.</i>	Digonocarpus,	Schleichera, <i>W.</i>	Xerospermum, <i>Bl.</i>
Ernstingia, <i>Neck.</i>	[<i>Fl. Fl.</i>	Cussambium,	Atalaya, <i>Bl.</i>
Moulinsia, <i>Camb.</i>	Trigonocarpus,	[<i>Rmp.</i>	Otophora, <i>Bl.</i>
	[<i>Fl. Fl.</i>	Koon, <i>Gärt.</i>	

TRIBE 2. *Dodonææ*.—Cells of the ovary containing from two to three ovules. Embryo twisted spirally. Leaves alternate.

GENERA AND SYNONYMES.

Kœlreuteria, <i>Lam.</i>	Amirola, <i>Pers.</i>	Dodonæa, <i>L.</i>	Evonymoides, <i>Sol.</i>
Cossignia, <i>Camb.</i>	Diplopeltis, <i>Endl.</i>	Alectryon, <i>Gärt.</i>	Ophiocaryon,
Llaguoa, <i>R. & P.</i>	Deinbollia, <i>Schum.</i>	Aledryon, <i>A. Cun.</i>	[<i>Schomb.</i>

TRIBE 3 *Hippocastanææ*.—Cells of the ovary containing two ovules, which are fixed to a dissepiment in the middle of each cell; the inferior ovule is ascending, and the superior pendulous. Embryo curved, inverted, with thick fleshy seed-leaves. Leaves opposite.

GENERA AND SYNONYMES.

Ugnadia, <i>Endl.</i>	Hippocastanum, <i>T.</i>	„ Macrothyrsus, <i>Spach.</i>
Æsculus, <i>L.</i>	Pavia, <i>Bœrh.</i>	Calothyrsus, <i>Spach.</i>

TRIBE 4. *Meliosmææ*.—Cells of the ovary containing two ovules, both of which are suspended. Fruit a drupe, one-celled and one-seeded by abortion. Embryo with oblong, folded-up seed-leaves, and an incurved inferior radicle. Leaves alternate.

GENUS AND SYNONYMES.

Meliosma, <i>Bl.</i>	„ Kingsboroughia, <i>Lieb.</i>
Millingtonia, <i>Rochb.</i>	Lorenzanea, <i>Lieb.</i>
Wellingtonia, <i>Meisn.</i>	

ANOMALOUS AND DOUBTFUL GENERA.

Picardia, <i>Jack.</i>	Magonia, <i>St. Hil.</i>	Racaria, <i>Aubl.</i>	Hippobromus, <i>E. &</i>
Pierandia, <i>Bl.</i>	Phœocarpus, <i>M.</i>	Eustathes, <i>Lour.</i>	[<i>Z.</i>
Hedycarpus, <i>Jack.</i>	[<i>& Z.</i>	Pedicellia, <i>Lour.</i>	Tarrietia, <i>Bl.</i>
Plöscia, <i>Endl.</i>	Valentinia, <i>Swz.</i>	Ptaeroxylon, <i>E. & Z.</i>	Iloruschuchia, <i>Nees.</i>
Xanthoceras, <i>Bung.</i>			

GEOGRAPHICAL DISTRIBUTION.—These are mostly tropical plants, and

more particularly natives of the tropics of America, where they are found in great abundance. They are pretty numerous in Africa, but in the temperate regions less so. Some of the Dodonææ are found in Australia and in China; and the Hippocastanæ are peculiar to the temperate countries of Asia and North America.

PROPERTIES AND USES.—The individuals of this family exhibit very varied properties; some produce among the most delicious fruits in the world; some are used for medicinal purposes, others yield a saponaceous principle, used instead of soap; and, while there are a few which are poisonous, there are others used as food.

Sapindææ.—The root of *Cardiospermum halicacabum*, or *Heart-seed*, is diaphoretic, diuretic, and aperient; and its leaves are cooked in the Moluccas as a vegetable. Some of the species of *Serjania* are poisonous—such as *S. noxia*, which is hurtful to cattle, and *S. lethalis*, which is very poisonous. *S. triternata*, or *Supple Jack*, is also poisonous, and used for stupifying fish. It has a long, slender, tough, and flexile woody stalk, which rambles in the woods to the tops of the highest trees; and when the wood is ripe it is cut down, barked, and used as riding and walking sticks. But in *Paullinia* this poisonous principle resides in a much more virulent form. From *P. cururu* the natives of Guiana extract a poison for their arrows; and the bark, leaves, and fruit of *P. pinnata*, abound in a principle which slowly, but surely, causes death, and is employed by the Brazilians for that purpose. The dangerous Lecheguana honey is procured from *P. australis*; and from *P. cupana*, a native of the banks of the Orinoco, an intoxicating drink is obtained. The seeds of *P. sorbilis*, a native of Brazil, supply a food called *Guarana bread*, which the Brazilians pound in water and sweeten, regarding it as stomachic, febrifuge, and aphrodisiac. It is made in the form of round or oblong cakes, and sold all over the country as a necessary for travellers, and as a cure for many diseases. The root of *Schmidelia serrata* is astringent, and is employed in cases of diarrhoea by the native physicians of Coromandel; and its fruit, which is small and red, is eaten when ripe by the natives; but those of *S. cobbe*, which are small black berries, are poisonous. The fruit of *S. edulis*, a native of Brazil, is sweet, with an agreeable taste, and is used in the dessert under the name of *Fruta de paraô*. The aril of *S. trijuga* is used in India as an article of food, and the bark is rubbed up with oil to cure the itch. The leaves of *S. cochinchinensis* are used by the inhabitants of Cochin-China as a cataplasm for contusions.

Common Soap-berry (*Sapindus saponaria*) is a native of the Caribbee Islands and various parts of South America. It is a tree twenty feet high, producing fruit of the size and shape of a cherry, the skin and pulp of which are so saponaceous as to be used instead of soap to wash linen. They will cleanse more linen than sixty times their weight of soap; but on account of their acid nature, they are, if often used, very apt to burn and destroy it. The seeds are round and hard, have a fine polish, and are frequently made into buttons and beads among the Spaniards. These nuts, which are of a shining black, were formerly imported to England for waistcoat buttons, some being tipped with gold and other metals, and as they did not wear and seldom broke, they were very durable and well adapted for the purpose. The seeds when pounded and put into ponds or rivulets intoxicate and kill fish. *S. marginatus*, a native of Georgia and Carolina, possesses the same

properties as *S. saponaria*. The aril, which surrounds the seeds of *S. esculentus*, is eaten by the natives of Brazil, and are the berries of *S. senegalensis*, by the natives of Senegal, and those of *S. capensis* at the Cape of Good Hope, where they are called *Wild Prunes*.

The *Akee Tree* (*Cupania sapida*) produces a fruit highly esteemed in Africa. It is a native of Guinea, and has been transplanted to the West Indies and South America. The tree grows thirty feet high, and the fruit is reddish or yellowish; about the size of a hen's egg, and with an aril of a very grateful subacid flavour. The wood of *Cupania sideroxylon* is so very hard and heavy that it is called *Iron Wood* in the Islands of Bourbon and Amboyna. It is of a reddish colour, very knotty, and very difficult to cut. It is used for stakes and poles. That of *Matayba guianensis* is also very hard and durable.

The far-famed *Li-tchi*, one of the finest fruits of the east, is the produce of *Nephelium Litchi*. The tree is a native of China and the East Indies, and was introduced to this country by the celebrated Warren Hastings. The fruit is the size of a date, and grows in loose spikes. They are covered with a scaly, hardish rind, which is red on one side and green on the other, containing a delicious, white, sweet, subacid pulp, and a large somewhat obovate brownish seed. The Chinese preserve the fruit during winter by drying it in the same way as prunes, and they use it in their tea, to which it communicates its fine subacid flavour, which is preferred to the sweetness of sugar. In the dried state they have of late years been imported to this country; and although they are necessarily inferior to the fresh fruit, still they preserve much richness of flavour. Mr. Archer says they have been sold in the Liverpool market as low as sixpence a dozen. The *Li-tchi* is cultivated extensively in the southern provinces of China, and the northern provinces of Cochin China, as it is impatient of either too much heat or too much cold; and the fruit is produced in the greatest perfection in the provinces of Fo-ki-en, Quan-tong, and Quan-si. Supplies of the fruit are packed in tin cases with spirits and honey, and transported to Peking for the emperor's use; and even the trees themselves are conveyed thither; being sent off when in flower, the fruit is generally ripe on arrival at Peking. When eaten to excess, the *Li-tchi* is said to create an eruption over the whole body.

The *Longan* (*Nephelium Longana*) is also a native of China, and held in high estimation by the Chinese for its delicious fruit, which is considered to be more wholesome, sweeter, and more fragrant than the *Li-tchi*. It is called by the Chinese *Long-yen*, or *Dragon's Eye*. It is more esteemed than the *Rambutan* (*N. lappaceum*), which is very generally cultivated in the East Indies. This fruit grows in clusters, is somewhat oblong or roundish, red and hairy all over, and less than a plum. The rind is easily removed, and is white inside. The pulp is white, loose, almost transparent, and difficult to tear asunder with the teeth, containing a viscid juice which has a sweetish acid taste, like that of lemon juice and sugar, and quenches thirst.

The *Honey Berry* (*Melicocca bijuga*), which is cultivated throughout the whole of the West Indies for its fruit, is originally a native of the Antilles and the Caraccas. It is a tree from sixteen to twenty feet high, with a jet-black fruit, the size of a bullace plum, with a very sweet and agreeable taste, the pulp being eaten after the skin is removed. The seed, which is in

the form of a nut, is roasted in the ashes like chesnuts. It is called *Jamaica Bullace Plum*, and by the Spaniards *Monos*, while it is known among the Dutch under the name of *Kuipnêe*. The fruits of other species of *Melicoccea* are also eaten, such as *M. olivæformis* and *M. (Schleicheria) trijuga*.

Hippocastaneæ.—In this tribe are included the Horse Chesnut of the Old and its allies of the New World. The *Horse Chesnut* (*Æsculus hippocastanum*) is a native of the temperate regions of Asia, but moving westward it was met with at Constantinople by David Ungrad, who, in 1576, sent it to Clusius at Vienna. Its introduction to this country was, however, direct from Constantinople, with which at that period we had extensive commercial intercourse. It speedily became an established favourite throughout Europe, and was very early much planted in France to form avenues, and as single specimen-trees in parks, but in England it was not so much cultivated; and so late as the beginning of the last century, it was raised from layers for want of nuts, it being stated by a writer of the period, that few of the nuts had yet begun to ripen in this country. This is another instance of what we have often heard about plants introduced from warmer climates, and propagated by cuttings or layers, not producing fertile seed so early or in such abundance as plants which are raised from seed. There is no instance now of a Horse Chesnut either not seeding or producing abortive seed. The tree is well known for its noble, symmetrical form and gorgeous flowers. It is said that, in Turkey, the nuts are ground and mixed with the provender of their horses, especially of those which are troubled with coughs or are broken-winded. The nuts are well adapted for feeding deer and swine, upon which the latter are found to fatten freely. But, before they can be rendered serviceable for this purpose, they must be steeped for two or three days in water, to extract their bitterness. In Switzerland they are crushed as food for sheep, and given in meals of two pounds to each sheep, morning and evening. They are said, not only to fatten the animals, but to communicate a peculiarly fine flavour to the mutton. The nuts abound in starch, which may be readily obtained in a state of purity, and it is said to excel, as an article of diet, that procured from the potato; and the bitter principle which they contain may be effectually removed by macerating them in an alkaline solution. The powdered kernel sniffed up the nostrils causes sneezing, and has been used successfully in diseases of the head and eyes. The bark, taken from branches from three to five years old, has been extensively employed on the continent as a substitute for Peruvian Bark. It has little smell, but is astringent and bitter, though not disagreeable. That which is collected in the spring is the best. The fruit affords a valuable, permanent dye for muslin or cotton, varying from buff to nankeen, according to its ripeness. When about the size of a gooseberry, cut the whole fruit into quarters and steep it in soft water, with just enough soap to tinge it; when deep enough for use, pour off the clear water. The colour from the whole fruit is not unlike that of annotta. When the fruit is nearly or quite ripe, the husks only, broken up and steeped in cold soft water with a tinge of soap, yield a dye which will be more or less bright, according to the degree of ripeness of the husk. The tree contains so much potass that it may be used as a substitute for soap. The timber of the Horse Chesnut is of inferior quality, and is not used for any other

purpose than for fuel. Of this tree there are several very beautiful varieties, of which the Scarlet-Flowering and the Double-Flowering are the best.

All the species of *Pavia* are well known in America by the name of *Buck-eye*. *P. macrostachya* has been called the *Edible Buck-eye*, from the fruit being eaten either boiled or roasted.

Dodonææ.—There are none of this tribe which are remarkable for their properties or uses. The seeds of *Llagunoa nitida* are black and shining, and are used for forming necklaces by the natives of Peru. The leaves of *Dodonæa viscosa* are used in fomentations and baths, and the seeds are esculent. The wood of *D. dioica* is recommended in India as carminative, and *D. Thunbergiana* is used at the Cape of Good Hope as a purgative and a febrifuge.

Among the anomalous and doubtful genera of this family, *Magonia pubescens* possesses poisonous properties. It is called in Brazil *Pao de Tingay*, and the leaves are used for stupifying fish. From the flowers, bees collect honey which is injurious; and the external bark is used to heal ulcers in horses, caused by the stings of insects. A gum exudes from the young branches of *Plösslea floribunda*. From *Ptaroxylon utile* is obtained the wood called *Sneeze Wood*. It is very solid, and rivals the mahogany in beauty. It is common in the eastern districts of the Cape of Good Hope, and grows from twenty to thirty feet high. The wood is of a bright gold colour, takes a fine polish, and is very strong and durable. It is used for various kinds of furniture and for agricultural implements. It is not easily affected by moisture, and is therefore well adapted for the construction of bridges and water-wheels. The sawdust has the property of causing the workmen to sneeze, and is, on that account, called by the colonists *Nieshout*, and by the English *Sneeze-wood*. The wood of *Eustathes sylvestris* is very hard and durable, and is used in Cochin China for building purposes; as is also that of *Hippobromus alatus* at the Cape of Good Hope.



ORDER XLV.—RHIZOBOLACEÆ—THE BUTTER-NUTS.

TROPICAL trees of immense size. *Leaves* opposite, palmate, with from

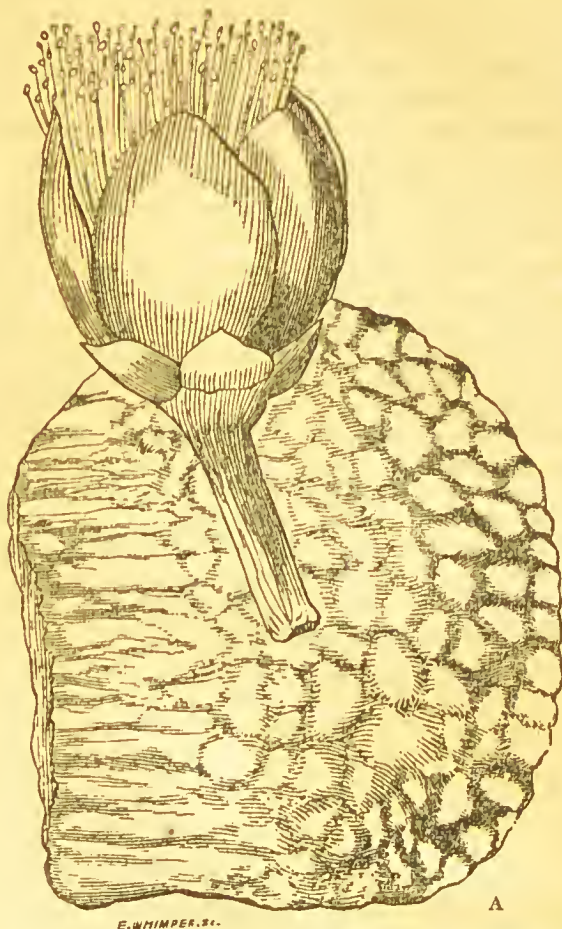


Fig. 68. Flower and nut of *Caryocar nuciferum*.

three to five leaflets, and with jointed footstalks and no leaflets at the base. *Flowers* hermaphrodite, regular, very large, arranged in racemes, and with their stalks jointed at the base. *Calyx* free, with five or six equal segments, and imbricate in æstivation, Fig. 54 B. *Corolla* with from five to eight petals inserted in the receptacle alternately with the segments of the calyx. *Stamens* very numerous, slightly united at their base; *anthers* two-celled, roundish, opening lengthwise. *Ovary* free, sessile, four to five-celled, or sometimes many-celled. *Ovules* solitary. *Styles* of the same number as the cells of the ovary, distinct, with minute capitate stigmas. *Fruit* containing four combined nuts, but usually fewer from abortion. *Nuts*, Fig. A, unopening, one-celled and one-seeded, with a thick membranous shell, which is warted and beset with bristles outside, but smooth on the inside. *Seed* three-sided, kidney-shaped, convexly keeled on the back, without *albumen*. *Embryo* curved, with a large fleshy radicle occupying the whole substance of the seed, and with very small seed-leaves lying in the furrow of the radicle.

GENERA AND SYNONYMES.

Caryocar, L.
Rhizobolus, Gärt.
Acanthocarya, Arruda.

Pekea, Aubl.
Souari, Aubl.
Anthrodiscus, G. F. W. Meyer.

GEOGRAPHICAL DISTRIBUTION.—These are all natives of the forests of Guiana and Brazil.

PROPERTIES AND USES.—All the species of *Caryocar* produce fruit containing nuts which are eatable, but that which is most highly esteemed is the *Sucarrow*, *Souari*, or *Butter Nut*, which is the fruit of *C. nuciferum*. These are sold in the shops of this country, and are greatly appreciated for their fine, bland, milky flavour. The tree which produces these nuts attains a height of 100 feet, the trunks rising like lofty columns, without branches, to the height of eighty feet. From the great height of the trees, it is a difficult matter to procure the fruit, and hence it is not met with in great quantities in this country. The tree is a native of South America in the districts of Essequibo and Berbice, but has been introduced to several of the West India islands, particularly to St. Vincent's, where it is cultivated. The kernel of the nut is pure white, soft, and fleshy, with the mild flavour of a sweet almond, but very much softer in texture. The wood of the *Butter Nut* is much used for ship-building; and an oil extracted from the nuts is greatly esteemed in Demerara, being little inferior to olive oil. *C. butryosum* also produces nuts which are eatable, and have the flavour of Brazil nuts: the wood of this species is likewise valuable as timber. Several other species produce eatable nuts, as *C. glabrum*, called *Saouari* in the markets of Cayenne; *C. amygdaliferum* and *C. amygdaliforme*. The nuts of *C. tomentosum* are much esteemed in Guiana, but are not so buttery as those of *C. nuciferum* and *butryosum*.



ORDER XLVI.—MELIACEÆ—THE BEAD-TREE FAMILY.

TREES or shrubs. *Leaves* alternate, simple or compound, and without leaflets at their base. *Flowers* either hermaphrodite or unisexual, regular, Fig. A; sometimes solitary in the axils of the leaves, and sometimes variously grouped in panicles or in racemes. *Calyx* entire, with four or five divisions more or less deep. *Corolla* with four or five, rarely three, valvate petals. *Stamens* generally double the number of the petals, rarely equal in number; they are always united, their filaments forming a tube which bears the anthers, some of which are on its summit, and others on its internal surface. *Ovary* placed on a hypogynous annular disk, Fig. B, with four or five cells, generally containing two lateral ovules, which are placed one upon the other, Fig. C. *Style* simple, terminated by a *stigma* which is more or less divided into four or five lobes. *Fruit* sometimes dry and capsular, opening in four or five septiferous valves, Fig. E; or sometimes fleshy and cherry-like, and occasionally one-celled by abortion. *Seeds* often furnished with a fleshy aril, and wingless. *Albumen*, when present, thin and fleshy, but sometimes wanting. *Embryo*, with leafy or thick seed-leaves.

TRIBE 1. *Meliæ*.—Embryo in the axis of a thin fleshy albumen, with leafy seed-leaves, and a protruding radicle.

Fig. 69. *Quivisia decandra*.

GENERA AND SYNONYMS.

<i>Quivisia</i> , <i>Comm.</i>	<i>Munronia</i> , <i>Wight.</i>	<i>Azederach</i> , <i>T.</i>	<i>Heynichia</i> , <i>Knth.</i>
<i>Gilibertia</i> , <i>Gm.</i>	<i>Turraea</i> , <i>L.</i>	<i>Azadirachta</i> , <i>A. J.</i>	<i>Schizocalyx</i> , <i>Hchst.</i>
<i>Calodryum</i> , <i>Desv.</i>	<i>Melia</i> , <i>L.</i>	<i>Mallea</i> , <i>A. J.</i>	<i>Cipadessa</i> , <i>Bl.</i>
<i>Naregamia</i> , <i>W & A.</i>			

TRIBE 2. *Trichiliæ*.—Embryo without albumen. Seed-leaves thick, with the radicle drawn back within them.

GENERA AND SYNONYMS.

<i>Aglaia</i> , <i>Lour.</i>	<i>Andersonia</i> , <i>Roxb.</i>	<i>Cabralea</i> , <i>A. J.</i>	<i>Guarea</i> , <i>L.</i>
<i>Camunium</i> , <i>Rmp.</i>	<i>Aphanamixis</i> , <i>Bl.</i>	<i>Didymochiton</i> , <i>Bl.</i>	? <i>Elutheria</i> , <i>P.Br.</i>
<i>Cambania</i> , <i>Com.</i>	<i>Dysoxylon</i> , <i>Bl.</i>	<i>Goniochiton</i> , <i>Bl.</i>	<i>Carapa</i> , <i>Aubl.</i>
<i>Milnea</i> , <i>Roxb.</i>	<i>Schizochiton</i> , <i>Sp.</i>	<i>Sandoricum</i> , <i>Cav.</i>	<i>Aylocarpus</i> , <i>Schr.</i>
<i>Nyalelia</i> , <i>Denn.</i>	<i>Chisocheton</i> , <i>Bl.</i>	<i>Ekebergia</i> , <i>Spar.</i>	<i>Persoonia</i> , <i>W.</i>
<i>Lansium</i> , <i>Rumph.</i>	<i>Synoum</i> , <i>A. J.</i>	<i>Walsura</i> , <i>Roxb.</i>	<i>Xylocarpus</i> , <i>A. J.</i>
<i>Sphæosaeme</i> , <i>Wl.</i>	<i>Schoutensia</i> , <i>Endl.</i>	<i>Hevnea</i> , <i>Roxb.</i>	
<i>Nemodra</i> , <i>Juss.</i>	<i>Hartighsea</i> , <i>A. J.</i>	<i>Trichilia</i> , <i>L.</i>	<i>Calpandria</i> , <i>Bl.</i>
<i>Amoora</i> , <i>Roxb.</i>	<i>Macrochiton</i> , <i>Bl.</i>	<i>Eleaja</i> , <i>Forsk.</i>	<i>Odontandria</i> , <i>Knth.</i>
<i>Amura</i> , <i>Schult.</i>	<i>Epicharis</i> , <i>Bl.</i>	<i>Moschoxylon</i> , <i>A. J.</i>	<i>Aitonia</i> , <i>L. f.</i>

GEOGRAPHICAL DISTRIBUTION.—The majority of this family are natives of the tropics in both hemispheres, and very few are found in temperate regions. They are abundant in Asia and America, less so in Africa, and rare in Australasia.

PROPERTIES AND USES.—The whole family is characterised by acrid and astringent bitter properties. Some are tonic and stimulating, while others are emetic and purgative. The seeds and seed vessels of some yield a bitter oil, but there are few which produce fruit that is sweet and agreeable.

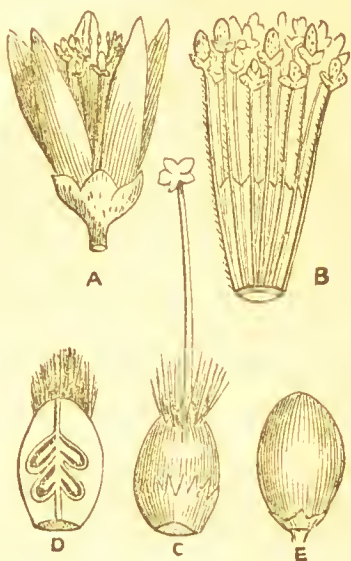
Meliaceæ.—The most important plant in this tribe is *Melia azedarach*, or *Bead-Tree*, sometimes called *Pride of India* and *Pride of China*. It is a native of India and Persia, but has been gradually naturalised in the south of Europe; and in the United States of America it has become so common that it lines the streets of cities, and is extensively planted as an ornament round dwellings. The fruit, which is the size of a cherry, is pale yellow when ripe, with a sweetish pulp. It was formerly considered to be poisonous, but it is eaten by the children of the southern states of America without inconvenience, and is reputed to be a powerful febrifuge. But it is for the bark of the root that the plant is most highly esteemed. This is of a bitter and nauseous taste, is cathartic and emetic, and in large doses is said to produce similar effects to Spigelia, especially if gathered at the period when the sap is rising. It yields its virtues to boiling water, and is an efficient anthelmintic. This is called the “Bead Tree” from the seeds being strung for beads by the Roman Catholics. From the fruit of this, as well as from that of *Azadirachta indica*, a fixed oil is extracted in India, which is used for various economic purposes, and particularly for burning in lamps. “This example,” says Richard, “is the only one, except the Olive, where a fixed oil is obtained from the pericarp of fruits, as it is well known that it is from the seed of all other vegetables that the principle is extracted.” *M. sempervirens* is called the Indian Lilac, and the fruit is poisonous. *A. indica* is the *Neem-tree* and the *Margosa-tree* of India, and is employed as a febrifuge. It yields, when tapped, a kind of “toddy,” which is regarded by the Hindoos as stomachic. The oil which is obtained from the fruit is said to be antispasmodic; and the fruit itself is oily, acrid, and bitter, as well as the bark. The wood is hard, heavy, and beautifully mottled, but when old is difficult to work.

Trichiliææ.—The leaves of *Aglaia odorata*, a native of Cochin China, are bitter, and the small yellow flowers are sweet-scented. The latter are said to be used by the Chinese to scent their teas. The aril which surrounds the seeds of *Milnea edulis* is thick and lucid, like that of the Li-tchi, and is eatable. *Lansium domesticum*, a native of the Antilles, produces a berry which, when immature, is filled with a glutinous milky juice, which oozes out and becomes black on exposure to the air, but when ripe is highly esteemed for its sweet, pleasantly acid, and vinous flavour. The seeds are bitter and anthelmintic. *Hartighsea Forsteri*, a native of the island of Namoka, and *Dysoxylon alligatum*, have a strong disagreeable smell of garlic; and some species of *Epicharis* are supposed to possess these characters. The root of *Sandoricum indicum* is aromatic, and is said to possess the same properties as that of *Melia azedarach*, and it is used in combination with the bark of the root of *Curapa obovata*, as a remedy for leucorrhœa. The

Cape Ash (*Ekebergia capensis*) is a native of the Cape of Good Hope, in the woods of Hautenequas and Essenboch. It grows to the height of thirty feet, and the trunk is two or three feet in diameter, furnishing an excellent tough timber, which is useful for planking, spars, beams, rafters, carriage-poles, all kinds of waggon work, and in the manufacture of many sorts of implements. *Trichilia emetica*, a native of Arabia, is a tree thirty feet high. It yields a fruit which is mixed with perfumes, and used by the Arabian women in washing their hair. The fresh seeds are made into an ointment, along with those of *Sesamum*, as a remedy against the itch, and its bark is said to be violently purgative and emetic. With a decoction of the root of *T. trifoliata*, a native of the island of Curaçoa, the negroesses procure abortion. All parts of the tree have an unpleasant smell. The same properties are attributable to *T. cathartica*, a native of Brazil, and there called *Jito*. It is a powerful purgative, and is even considered poisonous. *T. speciosa* yields a warm pleasant-smelling oil, which is employed by Indian practitioners as a remedy against chronic rheumatism and paralysis. The bark of *Walsura piscidea* is used in the East in the same way as *Cocculus indicus*, for stupifying fish. *Moschoxylum Swartzii* emits from all its parts a smell of musk, when rubbed, and hence it is called *Musk Tree* in Jamaica; the bark is said to possess bitter and tonic properties, and at the same time to be slightly purgative. All parts of *Guarea grandifolia* also smell strongly of musk,—so much so that the bark, which possesses the property in the greatest degree, may be used for the same purposes as that perfume, and the tree is therefore called *Musk-wood*. The wood contains a bitter resinous substance, which unfits it for making rum hogsheads, as it communicates both its smell and flavour to all spirituous liquors, but it is often used for staves and headings when other wood is scarce. The powder of the bark is sometimes used by the negroes as an emetic. The tree is a native of French Guiana and the Caribbee islands; it attains the height of thirty feet, and is known by the names of *Alligator-wood* and *Bois rouge*. The bark of *G. purgans* and *G. Swartzii* is used as a purgative by the natives of Brazil. *Carapa guianensis* is a native of the forests of Guiana, and is a tree attaining the height of sixty feet. It produces a fruit of the size of an apple, the seeds of which, when boiled in water, yield an oil, which is called by the inhabitants *Oil of Carapa*. This oil is thick and bitter, and is used by them for rubbing over their hair and all parts of their body, to protect them against the bites of insects and the humidity of the atmosphere. It is anthelmintic, and has the property of preserving iron from rust. The trunk of the tree furnishes masts for ships, and the bark has great reputation as a febrifuge. *C. guiniensis* is a native of Sierra Leone, and attains the height of thirty feet. Its fruit is also the size of an apple, and contains three or four large angular nuts, from which an oil is extracted, and used by the natives instead of soap, as well as for the purpose of anointing their bodies. It is called *Tallicoona* or *Kundah Oil*, and has an acrid and bitter taste. It is anthelmintic and purgative, and is said to burn well in lamps. The bark of *C. angustifolia* burned to ashes, and then mixed with fat clay, makes excellent pottery; and that of *Xylocarpus granatum* is excessively bitter.

ORDER XLVII.—HUMIRIACEÆ—THE HUMIRIUM FAMILY.

TREES or shrubs with balsamic juice. The *Leaves* are alternate, simple, leathery, and glossy, feather-nerved, often with glandular dots at the margin, and without leaflets at their base. *Flowers*, Fig. A, hermaphrodite, regular; either axillary or terminal, irregularly cymose or corymbose. *Calyx* with five equal segments, imbricate in æstivation, Fig. 54 B. *Corolla* with five petals alternate with the segments of the calyx. *Stamens* inserted in the receptacle, double or quadruple the number of the petals, rarely indefinite, united at the base, Fig. B. *Anthers* two-celled, opening inwards, the filaments of the stamens drawn out beyond them. *Ovary*, Fig. C, free, sessile, surrounded with a ribbed and toothed fleshy disk; five-celled, and each cell containing from one to two ovules, Fig. D. *Style* simple, crowned by a lobed *stigma*. *Fruit*, a drupe or cherry, containing a five-celled nut, or fewer from abortion; cell one to two-seeded. *Seeds* with a shining membranous skin. *Embryo* straight, oblong, in the axis of a fleshy *albumen*, with very short obtuse seed-leaves, and a long superior radicle.

Fig. 70. *Humirium floribundum*.

GENERA AND SYNONYMS.

Sacoglottis, Mart.
Humirium, Mart.
Humiria, Juss.

„ *Myrodendron*, W.
Humiri, Aubl.
Werniseckea, Scop.

Vantanea, Aubl.
Lemniscia, Schreb.
Helleria, Nees & Mart.

GEOGRAPHICAL DISTRIBUTION.—These are all found in tropical America, along the coast of the Atlantic.

PROPERTIES AND USES.—*Humirium floribundum* is a Brazilian tree, from twenty to thirty feet high, and is called *Umiri* by the natives. When the trunk is wounded it yields a sweet-smelling, limpid, yellow balsam, called *Balsam of Umiri*, which has very much the properties of Balsam of Capaivi, and little inferior to it. *H. balsamiferum* is a native of Guiana and Cayenne, and is a tree growing forty feet high. It has a thick bark, which also yields when wounded an abundance of balsamic juice, with a fine odour, like that of Storax. After it exudes from the bark it becomes brittle and transparent, and when burnt gives out an agreeable fragrance. An ointment, prepared from it, is applied to pains in the joints, and internally it is administered against blennorrhœa and tape-worm. The bark is used by the natives of Guiana to make flambeaux; the wood is employed in house-building, and on account of its red colour is called by the Creoles *Red-wood*.

ORDER XLVIII.—CEDRELACEÆ—THE BARBADOES CEDAR FAMILY.

LARGE tropical trees compose this order. *Leaves* alternate, pinnated, and without leaflets at their base. *Flowers* hermaphrodite, rarely unisexual, regular, arranged in axillary or terminal panicles. *Calyx* with four or five segments, more or less united at their base, and imbricate in æstivation, Fig. 54 B. *Corolla* with four or five petals alternate with the segments of the calyx, and either contorted or convolute in æstivation. *Stamens* double the number of the petals, either free or joined together, forming a toothed tube, Fig. B, and bearing the anthers on the inside of the tube. *Ovary* free, with sometimes four, but generally five cells, each containing from four to twelve ovules attached to their inner angle, and forming two longitudinal rows. *Style* simple, terminated by a flattened four or five-lobed *stigma*, Fig. A. *Fruit* a sort of woody capsule, with three or five cells; the valves separating from, and the partitions adherent to, the axis. *Seeds* numerous in each cell, flat, Fig. C, drawn out into a wing at the base or apex, or at both ends. *Embryo* erect, with leafy seed-leaves, and a short projecting superior radicle enclosed in a thin fleshy *albumen*, which is sometimes wanting.

TRIBE 1. *Swietenia*.—*Corolla* contorted in æstivation.



Fig. 71. *Swietenia Mahagoni*.

Stamens united into a tube.

OENERA AND SYNONYMES.

Swietenia, <i>L.</i>	Cedrus, <i>Mill.</i>	Chickrassia, <i>A. J.</i>
Mahogoni, <i>Adans.</i>	Khaya, <i>A. J.</i>	Chukrasia, <i>A. J.</i>
Roia, <i>Scop.</i>	Soymdia, <i>A. J.</i>	Plagiotaxis, <i>Wall.</i>

TRIBE 2. Cedreleæ.—Corolla convolute in æstivatiou. Stainens free.

OENERA AND SYNONYMES.

Chloroxylon, <i>D. C.</i>	Cedrela, <i>L.</i>	„ Cuveracea, <i>Jones</i>
Flindersia, <i>R. Br.</i>	Jonsonia, <i>Adans.</i>	Surenus, <i>Rumph.</i>
Oxleya, <i>A. Cunn.</i>	Cedrus, <i>Mill. p.</i>	

GEOGRAPHICAL DISTRIBUTION.—These are all found in tropical regions, particularly those of America and Asia. Of the Swietenæ only a single genus is found in America and Africa; and of the Cedreleæ, *Chloroxylon* belongs to India, *Flindersia* and *Oxleya* to the Molucca islands and Australia, and *Cedrela* to the sub-tropical parts of America and Asia.

PROPERTIES AND USES.—The bark of many of the individuals of this family is esteemed in India as a febrifuge, and has been commended as a substitute for Peruvian bark, on account of its aromatic and bitter tonic properties. Some, as the *Swietenia*, are valued on account of their beautiful timber.

Swietenæ.—The most valuable plant of the whole family is the *Mahogany Tree* (*Swietenia mahogoni*), Fig. 71. It is a native of South America, the West India islands, and Honduras. It formerly grew abundantly on the lowlands of Jamaica, but it is now only found in hilly districts and in places difficult of access. Some botanists are of opinion that there are two distinct species of tree which produce the wood known as mahogany, because both Gærtner's figure and that of the *Flora Mexicana* of Mocino represent the capsule of this tree opening by valves from the top; whereas in the species known to us it opens from the base. There is also a great difference in the trees and quality of the timber of Honduras mahogany, and that of Jamaica, Hayti, and Cuba. The tree attains the height of eighty feet, and rises with a clear trunk thirty feet high, and sometimes six feet in diameter at the base. The flowers are small, with a whitish or saffron colour, and are succeeded by a woody capsule, or seed-vessel of an oblong, oval shape, the size of a turkey's egg, and opening longitudinally in five parts. The seeds are winged, and get strewed over the surface of the ground; some falling among rocks take root in the chinks, and then creeping out on the surface, seek another chink, into which they creep, and swell to such a size and strength, that at length the rock splits, and is so forced to admit of the root's deeper penetration; and with this little nutriment the tree increases to a stupendous size in a few years. It thrives in most situations in the countries where it grows, but varies in texture and grain according to the nature of the soil. On rocks it is of a smaller size, but very hard and heavy, with a close and beautifully-shaded grain. That which is found in low, moist, and warm soils, grows rapidly, and the wood is therefore light, porous, soft, and spongy. This is the character of that which comes from Honduras, and is known by the name of "Bay-wood;" but although this is generally considered inferior to that produced in the West India islands, there are several varieties of it varying in quality, and some of which are

very beautiful. That which is produced in the islands of Cuba and Hayti is called "Spanish mahogany," and is remarkable for its close grain and beautiful veining, mottles, and curls; and it is this which is so highly esteemed for cabinet work. The prices which are sometimes obtained for a log of mahogany are truly marvellous. Some years ago, Messrs. Broadwood, the celebrated pianoforte manufacturers in London, gave £3000 for three logs, the produce of one tree, each log being about fifteen feet long and thirty-eight inches wide. This description of wood is too expensive to use in an ordinary way, and is therefore cut into veneers, eight to the inch, and is used for the most valuable descriptions of cabinet work.

The common kinds of mahogany are now considerably employed in ship-building. For this purpose they have, from an early period, been much used by the Spaniards, who generally employ that which grows in the Bahama islands. It is better adapted for this purpose than most woods yet known, being very durable, resisting gun shots, and burying the shot without splintering; nor is the worm so apt to eat this wood as that of the oak. It also affords very strong timber for building purposes, and answers well in beams, joists, plank boards, and shingles, for which purposes it was formerly frequently used in Jamaica.

The trees are two hundred years old before they are considered fit for cutting, and then they vary from four to six feet in diameter. Each tree is cut about ten or twelve feet from the ground, and the size of the log is regulated according to the number of oxen the gang have at their disposal to convey it from the forests. In the month of August gangs of from twenty to fifty men set out on the cutting expedition, headed by a leader, who is called "the huntsman." They range the forests until they come to a spot which is thought to supply the objects of their search. The huntsman then ascends one of the highest trees from which he can command a survey of the surrounding country; and as at this season the leaves of the mahogany tree assume a reddish-brown colour, he can distinguish at a great distance the localities in which they are growing. The gang always endeavour to settle down, if possible, on the banks of a river, where they erect temporary dwellings for themselves and their oxen. The operation of cutting now commences; and after a sufficient number of trees have been felled to occupy them throughout the season, they then begin to make roads and openings through the forest, either by cutting down or burning the timber and brushwood. All this is completed by the month of November, and then they begin to prepare the logs, by cross-cutting, trimming, and squaring, which lasts till March, when the drawing out begins. The labour of drawing out the logs on trucks is performed by oxen, and in consequence of the great heat of the sun during day, is conducted only in the night season. In May the rainy period sets in again, and in a few hours the roads are rendered impassable, and the work is relinquished for that season. From the far inland and many inaccessible places where the mahogany tree grows, there is much of the finest timber, which has never been removed, the natives having no mechanical contrivances of sufficient power to enable them to bring such weights as six or eight tons from these situations.

The first account we have of the mahogany tree is, that it was employed to repair some of Sir Walter Raleigh's ships at Trinidad in 1597; but there is no notice of it having been introduced to this country before the end of

the 17th or beginning of the 18th century, when it was brought over by a Captain Gibbons as ballast from the West Indies. His brother, Dr. Gibbons, was then erecting a house in King-street, Covent Garden, and gave it to the workmen to make boards, but being hard, they rejected it. The Doctor then gave a portion to a cabinet-maker named Wollaston, to make a candle-box; and when that was finished, it exhibited such beauty that it became quite an object of curiosity. Finding the despised mahogany created so much excitement, Wollaston made two *bureaus* of it—one for Dr. Gibbons, and the other for the Duchess of Buckingham; and the fame of the wood and the cabinet-maker became so great, that the fortunes of the latter were raised more speedily, and to a far greater extent, than he ever dreamed of when he grumbled over the hard-working wood of Dr. Gibbons' candle-box.

The bark of the Mahogany tree is astringent and bitter, and has been found to resemble Peruvian bark in its action on the human system.

Soymida febrifuga, or *East Indian Mahogany*, grows in the Rajah-mundry Circars, and is called *Rohuna* in India. It is a large tree, sixty feet high. The wood is of a dull red colour, remarkably hard, heavy, and durable, and, being considered by the natives the most lasting wood they have, it is, on that account, used for all the woodwork they have in their temples, and for all purposes where strength and durability are required. The bark is internally smooth, and of a light red colour, but externally rough and grey, of a feeble aromatic odour and an astringent bitter taste, but not at all nauseous or disagreeable. It is considered useful in intermittent fevers, and may be used in the same way as Peruvian bark. The dose of the powder is from thirty grains to half a drachm; and Dr. Ainslie found that when given beyond the extent of four or five drachms in twenty-four hours it occasioned vertigo and stupor. *Khaya senegalensis*, the *Senegal* or *African Mahogany*, is called by the natives of Senegal *Kassou-Khaye*. This is also a very large tree, growing sixty feet high, and producing timber which is very hard, durable, and of beautiful grain. It abounds in an astringent, bitter, and resinous principle; its leaves are employed as an astringent, and, reduced to powder, are used as snuff. The bark is administered in the cure of intermittents in the marshy regions on the coast of Gambia, and M. Caventou has extracted an alkali from it, which has been suggested as a cheap substitute for quina. *Chickrassia tabularis* furnishes the *Chittagong Wood* of Madras, where it is more used for making furniture than any other wood. It is found abundantly on the mountains of India, and receives its name from being imported from Chittagong. It is light, but very durable, and is apt to warp during the season of hot land winds.

Cedrelezæ.—The beautiful *Satin Wood* used in cabinet-work is the wood of *Chloroxylon Swietenia*, a large tree fifty feet high, growing on the mountainous parts of the Circars in India, and called by the natives *Billoo*. The wood is of a deep yellow colour, close grained, heavy, and durable, and, when polished, has a fine satin lustre and beautiful feathery shades. It is generally used in this country for picture-frames and fancy furniture, but it is liable to split. In India it is used for various purposes, and comes nearer to box-wood than any other in its native country. The polished wood, unless varnished, loses its beauty by age. The bark is powerfully astringent, but not bitter, and the tree is one of those which furnish the

wood oil of India, the leaves being full of pellucid dots, filled with that principle. *Flindersia australis* furnishes *Cailcedra* wood, which is little inferior to mahogany, and is much used for domestic purposes in Australia. *F. Amboinensis* is a native of the islands of Hiteo and Ceram. It grows sixty feet high, and the wood is used in the islands for making poles. The spiny part of the fruit is used as rasps by the natives of Amboyna. *Oxleya xanthoxyla* is an immense tree, a hundred feet high, growing on the eastern coast of Australia, and called by the settlers *Yellow Wood*. The wood is very yellow, and is used for various kinds of carpentry and for building boats.

Cedrela odorata is the *Sweet-scented Barbadoes Cedar*, a native of the Caribbee islands and Barbadoes. In the West Indies it is simply called "Cedar." The tree is upwards of eighty feet high. The flowers are pale flesh-coloured, and are like those of the hyacinth; the fruit, bark, and leaves have the smell of assafœtida, but the wood is fragrant and agreeable. The trunks grow to an immense size, and are converted into canoes by merely hollowing them out; some of which, when completed, are as much as forty feet long and six feet broad; and the wood being so soft and light, they carry a great weight on the water. The wood is of a brown colour, with a fragrant odour. It is much used as shingles for covering roofs, and is employed in ship-building, for which purpose it is ill adapted, on account of its liability to attacks from the worm. It is also used for wainscoting of rooms, and to make chests, because vermin do not so readily breed in it as in many other sorts of wood, this having a very bitter taste, which is communicated to whatever is put into vessels made of it, especially when the wood is fresh; and hence it is never made into casks, because the spirituous liquors would extract the resin, and thereby acquire a very bitter taste. In France the wood is employed for covering black-lead pencils, and it is said that the Havannah cigar-boxes are made of it. *C. toona* is a native of India and Nepaul, where it is called *Toon*. The wood is used for making various articles of furniture, and is very similar to mahogany, though lighter and not so close in the grain. The bark is powerfully astringent, but not bitter, and has been successfully employed in the cure of intermittents, particularly when combined with the powdered seed of *Guilandina bonducella*, which is a very strong bitter. The bark of *C. febrifuga* is also a powerful astringent, and has been beneficially applied in cases of epidemic fevers, diarrhœa, and the last stages of dysentery. It is a native of Java, and the wood is used for many purposes. *C. angustifolia*, a native of New Spain, is also a large timber tree, producing wood which is good for many purposes, and especially for making furniture. The tree has a powerful smell of garlic, which is communicated to the flesh of the parrots which feed upon the fruit. *C. rosmarinus*, a small shrub four feet high, and a native of Cochin China, yields an essential oil and a spirit, not inferior to that which is extracted from rosemary.

ORDER XLIX.—VITACEÆ—THE VINE FAMILY.

SHRUBS, or small trees, which are rambling, twining, stem-rooting, and

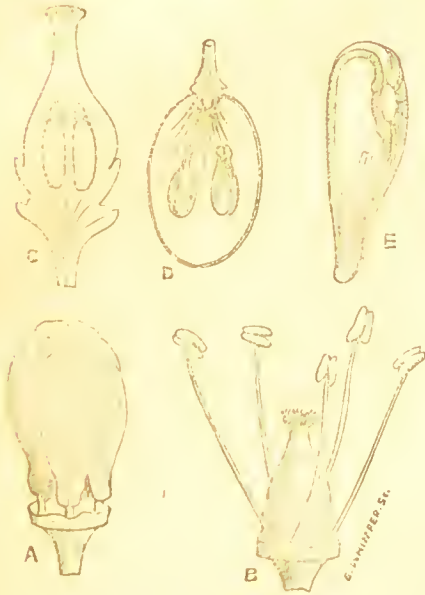


Fig. 72. *Vitis vinifera*.

furnished with tendrils opposite the leaves. *Leaves* alternate, stalked, simple or lobed, furnished with two deciduous leaflets at the base. *Flowers* generally hermaphrodite, regular, small, insignificant, and greenish, rarely purple; arranged in panicles opposite the leaves. *Calyx* very small, almost entire and nearly flat. *Corolla* with five valvate petals, sometimes united together by their superior part, and falling off altogether in the form of a hood, Fig. A. *Stamens* five, Fig. B, straight, either free or united at the base, inserted opposite the petals on the edge of a

hypogynous disk, lobed at its circumference. *Anthers* ovate, inserted by their back, and moving round as if on a pivot. *Ovary*, Fig. C, free, with two, three, or six cells; ovules erect. *Stigma* almost sessile, two lobed. *Fruit*, Fig. D, a berry, with two, three, or six one-seeded cells. *Seeds*, Fig. E, four, five, or fewer by abortion, sometimes wanting; erect, bony, fixed to the central axis by short threads. *Embryo* erect, one-third shorter than the albumen, with an inferior radicle. *Albumen* fleshy, hard.

TRIBE 1. *Vitæ*.—Petals and stamens free. Stamens opposite the petals. Ovary two-celled; cells two-seeded. Stem furnished with tendrils opposite the leaves.

GENERA AND SYNONYMES.

<i>Cissus</i> , <i>L.</i>	„ <i>Cayratia</i> , <i>Juss.</i>	<i>Ampelopsis</i> , <i>L. C. R.</i>
<i>Sarlanthus</i> , <i>Forsk.</i>	<i>Ingenhousia</i> , <i>Den.</i>	<i>Vitis</i> , <i>L.</i>
<i>Columellia</i> , <i>Lour</i>	<i>Irsiola</i> , <i>P. Br.</i>	<i>Pterisanthes</i> , <i>Bl.</i>
<i>Botria</i> , <i>Lour.</i>		

TRIBE 2. *Leeæ*.—Petals united at the base. Stamens alternating with the divisions of the corolla, and united at their base. Ovary three to six-celled; cells one-seeded. Stems without tendrils.

GENERA AND SYNONYMES.

<i>Leea</i> , <i>L.</i>	<i>Rhaganus</i> , <i>Meyen.</i>	? <i>Lasianthera</i> , <i>Palis.</i>
<i>Aquilicia</i> , <i>L.</i>	<i>Natalia</i> , <i>Hochst.</i>	? <i>Bersama</i> , <i>Fresen.</i>
<i>Outilis</i> , <i>Gært.</i>	? <i>Geruma</i> , <i>Forsk.</i>	

GEOGRAPHICAL DISTRIBUTION.—The Vine family inhabits the tropical and warm parts of both hemispheres, but the greatest number is found in Asia.

PROPERTIES AND USES.—The fruit of some of the species of *Cissus* is eaten, and that of several is employed medicinally. The berries of *C. urifera*, a native of Sierra Leone, *C. sicyoides*, a native of the West Indies, and *C. ovata*, a native of Brazil and the West Indies, are eaten by the natives of the respective countries in which they are found. Every part of *C. acida* and *C. trifoliata* is acid; *C. caustica* is caustic; and the root of *C. salutaris* is useful against the dropsy. The leaves of *C. setosa* and *C. cordata* are acrid, and when toasted and oiled are applied to indolent ulcers, to cause them to suppurate. *C. tinctoria* yields a blue colouring matter, which is employed by the native Brazilians to dye cotton fabrics.

The Vine (*Vitis vinifera*), Fig. 72, which is the type of the family, is well known, both for the uses to which it is applied and that of its products. Its native country is supposed to be the shores of the Caspian Sea; but wherever man has settled, there the Vine has been his companion. It is not within our province here to speak of the antiquity of Vine culture, or of its progressive distribution among the civilised nations of the earth, but rather to consider the present extent of its cultivation, and the products which it yields.

The open-air cultivation of the Vine in Great Britain is, in the present day, more for ornament than for use. In the southern and western counties of England this mode of cultivation has been followed, sometimes with greater and sometimes with less success; and the cases in which it is found to succeed best are those in which the plant is cultivated in calcareous soils. Those who are acquainted with the southern counties must have observed how almost universally the Vine forms the south wall covering of every cottage. In favourable seasons the fruit attains to a considerable degree of excellence, and we have on many occasions met with fruit so grown not inferior to some which has been produced under glass; but these are instances where care has been bestowed on the cultivation of the plant, and proper attention has been given to the thinning and management of the bunches. But even in cases where no care has been bestowed, we frequently find the soil and situation so well adapted to the growth of the plant, that very fair

fruit is obtained without any trouble, and a very respectable home-made wine is manufactured from the produce.

We frequently read accounts of vineyards having existed in this country in bygone times, and inferences drawn from this that our climate must have undergone considerable changes since then, because we do not cultivate the Vine in vineyards now; but it is not because the Vine would not succeed quite as well now as it did formerly, that such modes of cultivation have been abandoned, but that it would be found unprofitable to do so. Land and labour are now much more valuable than they were; and what satisfied a cultivator four or five centuries ago, would not do so now. Even at the time when vineyards did exist in this country, their cultivation was attended with various degrees of success, depending on good and bad seasons; and although we sometimes have now, seasons in which the grapes are produced of fair quality, and from which a good wine might be made, still they are so uncertain, that, in the present day, no one would like devoting any extent of ground, or investing money on a crop which, at best, is so capricious. And although our forefathers spoke in high praise of the wines they made being equal to the best that came from France, we know that our tastes have got far in advance of what were their ideas of good living, and it is not improbable that they have undergone considerable change in the estimate of wines also. Even in modern times we have accounts of vineyards being in some seasons successful. In 1763 there is an account given of one which then existed at Arundel Castle, in Sussex, the seat of the Duke of Norfolk. It is stated that this was "a noble vineyard," and had been planted some years previously; that it annually yielded considerable quantities of wine, and that there was then in the cellar at Arundel Castle upwards of "sixty pipes of excellent Burgundy." Although the wine was not equal in quality to Beaune, yet it was better than much of the Burgundy that was imported into England, or that which is commonly consumed in France. At the close of the last century vineyards existed at Kensington and Hammersmith, where good wine was obtained for sale; and that of Mr. Kirke, at Brompton, was well known in its time. The Hon. Charles Hamilton, at Pain's Hill, near Chobham, in Surrey, had a vineyard situated on the south side of a gentle hill, the soil of which was a gravelly sand. It was planted entirely with two sorts of Burgundy grapes, —the Auvernat, which is the most delicate and tender, and the Miller grape, or Black Cluster, which is more hardy; and the wine which he made from the fruit resembled Champagne.

The culture of the Vine extends from about the twenty-first to the fiftieth degree of north latitude, and reaches from Portugal on the west to the confines of India on the east. It is, however, only along the centre of this zone that the finest wines are made, those on the north being harsh and austere, and the grapes grown at the south are better adapted for making raisins, unless when they are grown in elevated positions, or on the slopes of mountains. Liebig states that the wines of warm climates possess no odour; wines grown in France have it in a marked degree, but in the wines from the Rhine the perfume is most intense.

The juice of sweet grapes consists of a considerable quantity of grape sugar, a peculiar matter of the nature of yeast, and a small portion of extractive, tannic acid, bitartrate of potassa, tartrate of lime, common salt, and

sulphate of potassa; the whole suspended or dissolved in a large quantity of water. Sour grapes contain in addition a peculiar acid isomeric with the tartaric, called *Paratartaric acid*. Grape juice, therefore, embraces all the ingredients essential to the production of the vinous fermentation, and requires only the influence of the atmosphere and a proper temperature to convert it into *wine*.

The process of *wine-making* of course varies in its details in different countries, and even in different districts of the same country. The following is the mode of procedure in the manufacture of Burgundy:—When the grapes are ripe they are gathered and brought to the cellar, where they are thrown into large square wooden cases, twelve feet in diameter, with perforated bottoms, through which the “must” runs into a vat beneath, and then trodden by a number of men with large wooden shoes, till the grapes are nearly all broken. They are then taken up in baskets, with interstices wide enough to allow the grapes to pass through, when generally about two-thirds of the stalks are taken out. If the whole of the stalks were taken out, the quality of the wine, as has been repeatedly proved, would be inferior. The whole is then put into the vat, into which the “must,” as it ran from the treading, had been previously carried. A space of about twelve inches is left unfilled at the top, and a sliding lid is put over, which floats on the surface. The temperature of the air being about sixty degrees, the fermentation gradually takes place in the “must,” and becomes fully established after a longer or shorter period. In the meantime the “must” becomes sensibly warmer, and emits a large quantity of carbonic acid, which causes the more solid parts to be thrown to the surface in a mass of froth, having a hemispherical shape, called “the head.” As soon as the fermentation becomes violent, the swelling of the mass lifts the lid to the height of six inches above the mouth of the vat. As, however, the skins and stalks had previously risen to the surface, none of the liquor escapes. A very small space, formed by the looseness of the lid, is considered sufficient to allow the gas to escape, until the rising of the lid allows a greater space. The liquor from being sweet now becomes vinous, and assumes a deep red colour. If the weather had been very warm when the grapes were gathered, and still continues warm while the fermentation is going on, the wine is soon made. The fermentation is sometimes over in thirty hours, at other times it continues ten, twelve, or even fifteen days; but the best wine is always produced from the most rapid fermentation. When the fermentation slackens, the liquor begins to subside; and when it is entirely over, sinks within the top of the vat, but not so low as when the vat was first filled, for the “mare,” or, in other words, the stalks and skins, are completely separated from the liquor, and floats upon the top. As soon as it is known, by the subsiding of the head, and by the taste and examination of the wine, that the fermentation has ceased, the wine is drawn off into large vats, which contain about 700 gallons each. Every three or four months it is pumped by means of the siphon and bellows into another vat of the same size. The wine has been found by experience to be of better quality, and to preserve its perfume better in those large vats than in casks. In making white wines, the grapes are pressed without being trodden; the “must,” as it flows from the press, is conveyed to small casks, where it is left to ferment, the casks being occasionally filled up to allow the serum to escape. The ferment-

tation of the white wine lasts from ten to fifteen, or even twenty, days. At the end of three weeks or a month, the white wine is drawn off the gross lees, which it has deposited, into clean casks. In the spring it is again drawn off into sulphured casks.

Wines are either red or white. *Red wines* are made from black grapes fermented with their skins; and *White wines* are made either from the juice of white grapes, or from the juice of black fermented without the skins. As regards their qualities, wines are either spirituous, sweet, dry, light, sparkling, still, rough, or acidulous. *Spirituuous wines* are made from fruit the juice of which is very saccharine, and contains sufficient of the yeast principle to sustain the fermentation and continue to convert the sugar into alcohol, until such a quantity of the latter is formed as will arrest the fermentation. *Sweet wines* are formed when the juice is highly saccharine, and the yeast principle so deficient in quantity that the production of alcohol will be less, and the excess of sugar proportionately greater. *Dry wines* are produced when the sugar and yeast principle are in considerable amount, and in the proper relative proportions for mutual decomposition, and then the wine will be strong-bodied and sound without any sweetness or acidity. *Light wines* are made from grapes which contain a small amount of saccharine matter, and consequently during fermentation there is only a small quantity of alcohol formed; and if the fermentation has not been in excess a sound wine will be the result, but if otherwise it is liable to pass into the acetous fermentation, and become vinegar. *Sparkling wines* are the result of bottling before fermentation is fully completed, and, the process proceeding slowly in the bottles, carbonic acid is generated, and the wine, being impregnated with it, becomes effervescing and sparkling. *Rough or astringent wines* owe their flavour to a portion of tannic acid derived from the husks of the grape. *Acidulous wines* arise from containing carbonic acid or an unusual proportion of tartar. Having thus noticed the varieties of wine as distinguished by their colour and qualities, we shall now glance at the different productions of the various wine-growing countries.

WINES OF FRANCE.

The principal wines of France are Champagne, Burgundy, Bordeaux, and Rhone, of each of which there are several varieties. *Champagne wines* are of two kinds, the white and the red, and these are again distinguished as "still" and "sparkling." The grapes which produce the best wines of Champagne are *Black Pineau*, which is the same as our *Black Cluster*, *White Pineau*, and *Grey or Golden Pineau*. The greatest care is necessary in conducting the manufacture of this wine. After the "must" has run from the press it is put into casks which have been previously sulphured to prevent the fermentation from proceeding too far. It is twice clarified during the winter, and in the month of March, before fermentation has been renewed, it is bottled off, and the bottles are placed diagonally in frames with their heads downwards. The lees are thus collected in the neck of the bottle, but it is not considered necessary to uncork the bottles as soon as the wine is perfectly clear; on the contrary, the lees are allowed to remain to ripen, as it is termed, longer than usual. The wine remains in

this state till the following winter, when each bottle is uncorked, and the contents of the neck are emptied; the bottle is filled up from another bottle of the same wine, and being re-corked, it now only requires age to give it all the perfection it is capable of. It frequently happens that wine has either undergone too little fermentation, or, being stronger than usual requires more before it is put into bottles, and then the fermentation being greater than the bottles are able to bear, a large proportion of them burst during the first summer. But the floors of the wine-cellars are furnished with grooves sloping to a gutter, and being scrupulously clean, the wine which is thus spilled is conveyed to a cistern on the floor, and thus frequently saved. The "still wines" of *Sillery* are made in the vineyards of that name, between Chalons-sur-Marne and Rheims, where they occupy a range of hills with an eastern or north-eastern exposure. The "sparkling wines" are those of *Ay*, a small town on the right bank of the Marne, and *Épernay*, also a small town on the left bank, a little higher up than Ay. The vineyards occupy the sides of chalky hills of no great elevation, and more or less steep, but in no part requiring the soil to be supported by terraces. The range of hills above the town of Ay has a full south exposure; and, consequently, here wine is grown much superior in quality to that of Épernay, which is grown on hills exposed to the north. *Sillery* is of a light amber colour, with a good body, and delightful aroma, and, from the analysis of Brande, contains 13·3 per cent. of alcohol. The wines of Ay are highly esteemed, and those are considered the best which have a creamy surface, and do not rise in froth like cider or perry. Champagne contains, according to the analysis of Verry, 11·93 per cent. of alcohol. There are several other varieties of Champagne, as *Mareuil*, *Hautvilliers*, *Pierry*, and *Dizy*, which all partake of the character of the finest qualities.

The *Burgundy Wines* of the finest quality are produced in a district called Côte d'Or, in the department of that name. These are supposed to be the finest and most delicate red wines in the world, full of rich perfume, of exquisite bouquet, and fine purple colour. They are light, yet with body and spirit sufficient to render them pleasant and healthful in use. The grapes which produce the best wine are those known in this country as *Miller's Burgundy* and *Black Cluster*; but there are others employed, as *Melon noir*, *Gibaudot*, and *Gammé*, which produce the *vins ordinaires*. *Melon blanc* and the *Chasselas* are used for the white wines. The finest wines of this class are *Romanée-Conti*, a very rare and choice wine, grown about twelve miles from Dijon, and very seldom procurable, there being not above four acres of extent on which it is made. *Chambertin* is produced near the village of Gevray, about five miles from Dijon, and the extent of ground occupied in the vineyards of this name does not exceed between thirty and forty acres. The soil is a brown loam, very gravelly, and of a calcareous description. This wine has a fine colour, full body, and mellow, with a very rich bouquet. *Clos Vougeot* is also one of the finest wines of this class. The vineyard is about three miles from the former, and occupies about 112 acres. These wines are similar in quality to the above, but are more spirituous, and they are of two kinds; those which are produced in higher situations being much superior to those grown in the low part. *Richbourg* approaches in quality to Romanée-Conti, but is more highly coloured, less delicate, and is distinguished for fulness of body, and high

bouquet. The other varieties of Burgundy are *Romanée de St. Vivant*, *La Tâche*, *St. George's*, and *Corton d'Aloxe*. Though reckoned among first-class wines, these are all somewhat inferior to the others we have mentioned. The second-class Red Burgundies are *Vosne*, *Nuits*, *Premay*, *Chambolle*, *Volnay*, *Pomard*, *Beaune*, *Morey*, *Savigny*, *Meursault*, and *Les Cras*. The white wines of Burgundy, though not held in such high repute in this country, are much esteemed on the continent. The most choice of them are *Mont Rachet*, with a high perfume and nutty flavour, grown at Puligny, in the canton of Nolay; *Meursault*, often sold for *Mont Rachet*, and *Coteau de Perrière*. *Chablis* is much esteemed, and the best growths are considered among the second in the kingdom. Burgundy wines contain 14.57 per cent. of alcohol.

Bordeaux Wines, called in this country *Clarets*, are produced on the banks of the Gironde, in a district called Bordelais. The characters of the first qualities are, fine colour and delicate flavour, light, less warm than Burgundy, with a violet perfume and rich purple hue. The principal grapes which produce the white clarets are *Muscat of Alexandria*, *Malaga*, *Sémillon blanc*, *Corinthe*, *Œil de Perdix*, *Sauvignon*, *Auba*, *La Chalosse*, *Cru-chinet*, and *Verdelette*. They are divided into—1. Wines of Medoc. These vineyards occupy an extent of country sixty miles in length and three in breadth; they are distinguished by high and low Medoc, the produce of the latter being inferior in quality. 2. Les Graves, a district extending from Bordeaux to nine miles distance from the town, and the soil of which is gravelly. 3. Les Palus, are alluvial lands, between the Garonne and Dordogne. These wines are very deep-coloured, full-bodied, harsh and coarse in the first years, but improve and become excellent by keeping. 4. Les Côtes, are the hills which border on the Garonne and Gironde from Langon to Blaye, and the wines of this district have a good body and colour. 5. Les Terres Fortes, are those parts of Medoc where there is no gravel. 6. Entre deux Mers, is between the Garonne and Dordogne, and the wines are of very inferior quality. The finest varieties of Clarets are *Lafitte*, a very fine, light, full-flavoured, very smooth wine, with an exquisite bouquet, partaking of the violet and raspberry. *Chateau Margaux* has the same delicate qualities, though not quite so high a flavour; while *Latour* has fuller body, much flavour, and bouquet, but is less fine and smooth than either of the former. *Haut Brion*, in the district of Les Graves, supplies a wine with greater body and more spirit than any of the former; it has also more aromatic fulness, but less bouquet. Though these are considered the first-rate qualities of clarets, there are many which rank in the second class little inferior to some of them,—as *Rozan*, which has a deep purple colour, delicate flavour, and more or less of a violet perfume; *Leoville* and *Larose*, abounding in flavour and bouquet; *Haut Talence* and *Merignac*, with qualities similar to Haut Brion; *Branc Mouton*, fine and light, resembling Lafitte; *Calon*, full-bodied wines, with both flavour and bouquet; *Pichon Longueville*, light wines, spirituous, and fine, but not so rich in flavour as any of the preceding; *St. Julien*, which ranks as a third class claret, and is celebrated for its bouquet and flavour. The varieties of clarets are almost innumerable; and when it is considered that there are upwards of 200,000 acres under cultivation producing wines of this class, the varieties produced must be considerable. Red Clarets contain about

13·5 per cent. of alcohol. The grapes which produce the red wines are the *Red* and *Black Frontignan*, the *Black Prince* or *Alicant*, *Malaga du Lot*, *Grand Vidure*, *Carmenet Cămanere*, *Malbeck*, *Pétouille*, *Mauein*, *Balouzet*, *le Tarnex*, *Cotat*, and *Chasselas*. The white wines of Bordeaux are of excellent quality, lightish brown in colour, with a most agreeable aroma, and some have rather a sweet taste. The districts which produce them are Les Graves, already mentioned, Sauterne, a district of Langon, on the left bank of the Gironde; Barsac, a district of Podensac, also on the left bank; and Pontac. The difference between the wines of these districts arises from the condition of the grapes at the time of gathering. Those of Les Graves are gathered at once, while those of Sauterne and Barsac are gathered at different times, as they get quite ripe, and the skin sticks to the fingers. The celebrated white wines of Les Graves are *Saint-Bris* and *Carbonnieux*, dry, with an aromatic bouquet, and highly esteemed. Those of Sauterne are very firm, fine, spirituous, with an aromatic flavour, and fine bouquet; and the most choice are *Duroy*, *Yquem-solus*, and *Le Fihol*. The wines of Barsac, and particularly those of high Barsac, are equal in value with those of Sauterne; but they differ in being more spirituous, so much so that in a favourable season they burn like brandy; they are also less fine, not so full-flavoured, and with not so much bouquet. Pontac wines possess all the qualities of those of Les Graves, but are without their peculiar flavour; they keep well, and improve by keeping. *Preignac* and *Beaumes* have very much of the qualities of Barsac and Sauternes, but have less spirit than the first and less flavour than the last. The white wines of the second quality are *Langon*, *Cérons*, and *St. Croix*, which has a fine and peculiarly agreeable flavour. The pale-coloured Clarets, particularly those of Barsac and Sauterne, contain about 14 per cent. of alcohol.

The best *Wines of the Rhone* are those of *Lyonnais*, *La Drôme*, *Ardèche*, *Gard*, and *Herault*. The Red Wines of *Lyonnais* are grown on the *Côte Rôtie*, about twenty miles from Lyons. They are grown on two sides of the hill, and are distinguished as *Côte Rôtie brune* and *Côte Rôtie blonde*. They possess considerable body, spirit, and fineness, and a very pleasant flavour and perfume. They should remain in cask five or six years before being bottled, after which they improve for many years. Similar, but inferior in quality to these, are the wines of *Verinay*, between St. Colombe and Ampuis, and these are frequently sold under the name of *Côte Rôtie*. The most celebrated white wine of this district is *Condrieux*, produced lower down on the right bank. It has a good flavour, full body and spirit, with an excellent bouquet, and keeps a long time, when it becomes amber-coloured, and its name is a decoy for many inferior wines of the neighbourhood. But it is those of *La Drôme* which have the greatest reputation and are held in the highest estimation. Near Tain, a small town about twelve miles from Valence on the left bank of the Rhone, the celebrated vineyard of *Hermitage* is situated. It is on a hill which is so called from an ancient hermitage, the ruins of which are still in existence near its top. It was inhabited by hermits till within about a century and a half ago. The hill, though of considerable height, is not of great extent; the whole front which looks to the south contains about 300 acres, and is so steep as to require the soil supported by terraces. The whole is exposed to the sun during the day and protected from the north. The lower part of the hill is of earth

which has been washed down by the rains, and is too rich to yield wines of the best quality, and a part near the top is too cold to bring its produce to maturity, and hence there are several different varieties of Hermitage, arising from the different kinds of soils which are found on the hill, the greater part of which are calcareous; but the finest kinds are obtained from the grapes of these various soils being mixed. The Grape which produces the finest Red Hermitage is the *Ciras* or *Siras*; and those which produce the White are *Marsane* and *Roussane*, the former yielding by itself a dry and spirituous wine which easily affects the head, and the latter a sweetish wine, both being mixed to produce the finest *White Hermitage*. The process of manufacture is as follows:—A large screw-press is erected in the centre of a square trough about seven feet in diameter and a foot high in the sides. The grapes, without any previous treading, are built up in the trough to the height of the screw, and when the latter is turned, the “must” flows from spouts which issue from the bottom of the trough at each side. When it has been so completely pressed that not a drop of “must” remains in the “mare,” the “mare” is disposed of, and employed to produce a bad brandy; for which purpose it is soaked in water to extract any saccharine matter which may remain, and the fluid which is obtained, when again pressed, is fermented and distilled. As the “must” flows from the press it is conveyed to the casks, where it ferments from five days to a month, according to the strength of fermentation, the casks being always kept full to permit the scum to escape. When the first fermentation is decidedly finished, the wine is drawn off into a clean cask which has been previously sulphured; and this is the whole process of making the white wines of Hermitage. After having undergone the complete fermentation already described, this wine still retains a disposition to effervesce when put into bottle. It is said to be without exception the finest white wine of France, and will keep for a hundred years, improving as it gets older. In making the Red Wines of Hermitage, the grapes as they are brought from the vineyard are trodden in troughs, and then emptied into vats; and while the vats are filling, a man gets into them once a day to tread down the surface, the object of which is to prevent the surface from becoming sour by exposure to the air, and to render the fermentation as equal as possible through the whole mass. When it becomes too deep for a man to tread it to the bottom, he suspends himself by the middle from a plank across the vat. The duration of the fermentation is very uncertain, depending on the state of the weather and the ripeness of the grapes. The finest Red Hermitage is produced on the southern slopes of the hill, called *Mas*, and is of several varieties, viz.: *Meal*, *Grefieux*, *Beaune*, *Raucoule*, *Murel*, *Guignieres*, *Les Bessas*, *Les Burges*, and *Les Lands*. The wine of Bessas differs particularly from the others, as being of a deeper colour, with less fineness and perfume, but it keeps longer, and is more abundant, and on account of its colour is sought for by merchants for mixture with other wines. Bordering on the Hermitage, wines of similar character, but inferior quality, are produced. These are *Crozes*, *Merceurot*, *Gervant*. The other red wines of La Drôme are those of *Saillans*, about nine miles from Die, and *Vercheny*, near Die; *St. Maurice*, six miles from Nyons; *Etoile*, *Lison*, and *St. Paul*, near Valence; but these are all of very inferior quality to Hermitage. The finest White Hermitage are produced in the *Mas Raucoule*. They are full-

bodied, spirituous, fine, pleasant, and of exquisite flavour and perfume. They are bottled four years old, keep well, and improve by age. A wine made on the Hermitage, and called *Vin de Paille*, is highly prized. It is of a golden colour, and delicious perfume and flavour. The grapes are either laid upon straw, or suspended on poles, six weeks or two months; when partly dry they are stripped from the bunches and pressed; the juice is very thick and viscid, but becomes fine by fermentation. It is kept for several years before it is bottled. It contains 17·43 per cent. of alcohol. The other white wines of Le Drôme are *Merecurole*, somewhat like but much inferior to Hermitage; wines, grown in the neighbourhood of Die, and called *Clarette de Die*, which sparkle like champagne, but lose their quality after two years; and *Chanson Curson*, in the canton of Tain, which is a sweet weak wine, but of pleasant flavour.

Wines of Ardèche are rich in colour, have much body and firmness, and in favourable years have a flavour of Ratafia. They equal the second-rate wines of the Hermitage, and will keep for twenty-five years. They are much used by the Bordeaux merchants to make up their wines. The finest red varieties are *Cornas*, in the canton of St. Peray, near Tournon, and *St. Joseph*, near Tournon; but the latter is very much inferior to the former. The finest white wines are those of *St. Peray*, near Valence. These are of great delicacy, spirit, and an agreeable flavour peculiar to them, partaking of the violet. Bottled in the spring, they sparkle like champagne. The best are produced in the vineyard of Gaillard. The vineyard of St. Jean produces a small quantity of a light, delicate, well-flavoured wine, called *Vin de Cotillon*, which effervesces like *St. Peray*.

The *Wines of Gard* are those which are known in commerce as *Vins de Languedoc fins*. They are light-coloured, fine, light, and agreeable. They keep a long time, and improve by age, and they bear carriage well by land or sea. The first-class varieties are those of *Chuzelan*, two miles from Pont St. Esprit; *Tavel*, near Roquemaire—this is very fine and spirituous; *Lirac*; *St. Geniez*, like those of Chuzelan; *Ledénon*, and *St. Laurent-des-Arbres*.

The *Wines of Hérault* are sweet, rich, and luscious, and the red varieties are generally used to strengthen weaker sorts. These are *St. George d'Orques*, a wine of a free and agreeable flavour, and after three years, is equal to those called "Passe-tons-grains," in Upper Burgundy, but stronger. *Verargues* and *St. Christol* are higher coloured and more firm than the preceding. *St. Drézery*, *St. Geniez*, and *Carries* have less body and colour than those of St. George, but are dry and pleasant. Of the Muscat white wines, the finest are the *Frontignan*, which rank next to those of Rivesaltes, the best in France; they have a light colour, a luscious taste, and a grape flavour, and contain 12·79 per cent. of alcohol. They improve by age, and bear carriage well, both by land and sea. *Lunel*, or *Clos Mazet*, is less luscious than Frontignan, has less body, and does not keep so long. It is of a bright yellow colour, and the best varieties of it are esteemed as highly as those of Frontignan. They contain 15·52 per cent. of alcohol. *Marseillan* and *Pommerols* are rich, luscious, sweet wines, and very little exported. They keep long and bear carriage well, and are used to give flavour to wines which want it. The "must" of the grape of which these are made, and which is called "*Picardan*," is used to make the wine known as *Muet*, or that whose fermentation is stopped by sulphur.

The Muscat wines of Montbasin, called *Muscatelles*, unless drunk within three or four years, lose their flavour and sweetness.

There are many other departments of France which produce several excellent wines; but in a work like the present we cannot go so minutely into the whole subject as even our own feelings would lead us. We shall, however, before concluding this notice of the most important growths of France, mention a few which are held in high reputation, or are known from their popularity, and which do not come under the foregoing classifications. Twelve miles from Marseilles are the vineyards of *Rouquevaire*, the wines of which have a fine perfume, and are the best red and white Muscat wines. They come under the varieties called *vins de liqueur*. About four miles from Pau, in the Pyrenees, the *Red* and *Pale Jurançon* are produced. The Red have a good colour, body, spirit, flavour, and fine bouquet. The Pale, formed by a mixture of red and white grapes, are very light, fine, delicate, and of a very pleasant flavour. *Gan*, produced in a vineyard adjoining the last, produces wine of the same kind, but more full-bodied and firm, and keeps well. The *White Wines of Jurançon* are distinguished by a taste and perfume like that of a truffle, and those of Gan are less delicate, but better-bodied. In the department of Pyrénées Orientales the wines of *Roussillon* are produced. The varieties are *Bagnols*, of a very deep colour, full of body and spirit, firm, and very good flavour. By age they gain fineness and a bouquet; after ten years their colour is that of gold, and from their taste they are called *rancio*, as resembling the wines so called in Spain. They improve up to thirty years, and keep till fifty. *Cosperon*, *Callioure*, *Tarentula*, and *Terrats*. These are fine wines, with less body than the former, but of the same kind and quality; the two last are called "Rancio," and have a dry and pleasant perfume. The famous "vin de liqueur," called *Rivesalles*, or *White Roussillon*, is produced six miles from Perpignan. It is esteemed the best "vin de liqueur" in France, and, by some, the best in Europe. It is of a bright golden colour, fragrant aroma, and has a quince flavour. But there is also a *Red Rivesalles*, which, with *Baixas*, *Corneilla-de-la-Ribera*, is a wine of good colour, body, and spirit, but are of an inferior description to the preceding, and are called "vins de plaine." *St. Jean de la Cella*, *Bagnouls-des-Appres*, *Salces*, *St. Estephe*, and *Villeneuve de la Rivière*, are all varieties of Roussillon of the common kind, and are used for mixing with other wines; but the best wines are drunk more as tonics than as table wines. Some of the finest "vins de liqueurs" are those of *Colmar*, *Kaisersberg*, *Ammerschwir*, *Ollwillers*, *Kientzheim*, and some other vineyards in the department of Haut-Rhin.

WINES OF SPAIN.

The Spanish wines, with which we are most familiarly acquainted in this country, are those of Xeres, and their varieties known by the name of *Sherry*, or *Zerry*; but there are a great many wines grown in other parts of the south of Spain, imported to this country, which are sold under that name. The district in which the true Sherry is produced is in the neighbourhood of Xeres de la Frontera, twenty-one miles to the north of Cadiz; and the whole extent of vineyards, which produce wine fit for the British market, does not exceed 7000 acres; but including those of Puerta San

Maria, and San Lúcar, they may be estimated at double that extent. A great number of the wines exported to Great Britain under the name of Sherry are the growth of Malaga, and are brought round and transhipped at Cadiz. Most of the sherries sold in this country under 40s. a dozen are either of this kind or the commonest qualities of San Lúcar, and Puerto San María vineyards, if they are nothing worse; and all these low-priced wines are largely mixed with brandy, being intended for the consumption of a class who are unable to judge of any quality in wine but its strength. The whole quantity of Sherry annually exported from Xeres does not exceed 25,000 butts; and in no case do the exporters send a genuine natural wine as it comes from the press, without a mixture of other qualities. No wine is allowed by law to be sold till it is twelve months old, but the more respectable wine-merchants never ship wine for this country till it has attained the age of two years.

The exporters purchase the wine from the growers when it is generally about one year old, and the ordinary stock of one of the largest houses in Xeres is said to be 4000 butts; and this is kept in casks of various sizes, containing from one to four butts. These casks are ranged in the cellars in regular rows, in some parts of the cellar to the height of four tiers. They are called "soleras," and are always kept in the cellars, and contain wines of various qualities and ages, from one to fifty years old. The wine merchants never exhaust their stock of finest and oldest wine. According to the price at which the wine sent to market is intended to be sold, so it contains a larger or smaller proportion of old wine. But it is only in wines of a very high price that even a small portion of their finest wines is mixed. What is drawn from the oldest and finest casks is made up from the casks which approach them nearest in age and quality, and these are again replenished from the next in age and quality to them; thus a cask of wine said to be fifty years old may contain a portion of the vintages of thirty or forty seasons. The higher qualities of Sherry are made up of wine the bulk of which is from three to five years old, and this is also mixed in various proportions with older wines; thus from the gradual mixture of wines of various ages, no wine can be further from what may be called a "natural wine" than Sherry.

The grapes which produce the wines of Xeres and the districts round Cadiz are *Pedro Ximenes*, a variety said to have been originally introduced by Cardinal Ximenes. It furnishes about one-eighth of the wines of Xeres. Its "must" is considered the most valuable either for sweet or dry wines, and it enters largely into the composition of all the most valuable wines of the south of Spain. *Muscatel Menudo Blanco*. *Mantuo Castillan* is chiefly cultivated in the sandy soils about Xeres, and is more highly esteemed as an eating grape than for wine. It is also hung up to keep for winter use. *Uva del Rey*. *Mollar* is a black grape, and is planted about Xeres in the proportion of one-third in the vineyards of the sandy soils. At Arcos, Espera, and Paxarète, all within the same district, it occupies four-fifths of the vineyards. The wines which are produced from these are, of course, of various kinds and qualities, according to the vineyards in which they are grown. That which is most highly esteemed is *Paxarète*, luscious and highly flavoured; *Vino Seco*, dry and bitter, with a good bouquet, and supposed to be the true *Sack*, at one time so celebrated in this country; and

Abocado, which is in quality between the other two. All of these are grown in the vineyards of the ancient monastery of Paxarète, about four miles from Xeres. The wines of *Zalogne* and *Carlón* are esteemed, and the growths of San Lucar are largely employed by the merchants of Xeres to mix with their own; they are called "Muscat Wines," and are of superior quality. At Rota, on the sea-coast, fifteen miles west of Cadiz, a red wine called *Tintilla* is produced. That which is known by the name of *Amontillado* is a prime dry wine of a deep amber colour, and with a nutty and aromatic flavour. It is generally said to be produced in a way which no one can account for, as it is not possible to say beforehand whether the wine, when fermenting, will turn out Sherry or Amontillado. If so, it is probable that it is the effect of a more perfect fermentation. From its very dry character and peculiar nutty flavour it is frequently used for mixing with wines which are wanting in these properties; and being light in colour, it is used to reduce the colour of Sherries which are too high. When it is required to increase the colour of wines, they are mixed with boiled "must" or boiled wine, which, being reduced to one-third of its bulk by boiling, assumes the taste and consistency of treacle.

The *Wines of Malaga* are similar to Sherry, but very inferior in flavour, and retain a sweet taste till they are two years old. The old *Mountain*, or *Sweet Malaga*, which was formerly so much in demand, and formed the chief export of Malaga, is now almost out of fashion throughout the world, and is very little made. *Pedro Ximenes* is a white sweet wine, made from the grape of that name, and, mixed with a small portion of Muscat, gives it the flavour of a Muscat wine. There are two kinds of Muscats—*Muscat de Malaga* and *Muscat de Larmes*. The sole difference between this wine and the Mountain is, that the latter is mixed with a portion of "must," which has been boiled down to one-third. There is also a large quantity of dry wine made in the district, similar to that of Xeres, but much inferior, and is sold under that name, or shipped to Cadiz to be mixed along with the Sherries. The difference in the making of sweet and dry wines is, that when the grapes are intended for the former, they are spread out for three or four days in the sun before they are pressed.

The farmers in the neighbourhood of Malaga do not, like those of Xeres, hold their wine twelve months before selling it to the merchant; they have earthen vats of the shape of an urn, and sometimes large enough to contain two or three butts. Into these vats the "must" flows as it is pressed; and as they become full, in order to make room for more, the wine is conveyed from them, more or less fermented, to the stores of the merchant. Their means of conveyance is by mules and asses, the wine being carried in sheepskins, which, from being constantly used, do not give any taste to the wine. Near Alicante the famous red wine, called *Tinto*, or *Tent*, is produced. In growing old it contracts a sharp taste, and is called *Fondolol*, to distinguish it from the new. There are, of course, many other wines in Spain, but they are generally consumed by the inhabitants, and rarely or ever come to this country.

WINES OF PORTUGAL.

The vines which border on the Minho grow high, and are situated on the plains; but those on the Douro are low, and trained on trellises, and

from these the best wines are made. The Portuguese wine which is best known among us is *Port*, and is so called from being shipped at Oporto. It is produced in the province of Upper Douro, under a monopoly granted by the government to the Oporto Wine Company in 1756, and this company has the exclusive commerce of the wines of this part. Its members are bound to take the wine of each cultivator at a fixed price, and the cultivator cannot sell to any other person but through the company, who receive a toll of six per cent. upon the value of the sale. A certain district is marked out by its charter as the only one on the Douro in which wine is to be raised for exportation, and the entire and absolute disposal of the wines grown in this district is in the hands of the company. The country is divided into districts, one of which furnishes the wines called *Vinhos de Feitoria* and the other *Vinhos de Ramo*. The first are much superior in quality to the other; they ferment longer in the vat, and when barrelled, one twelfth part of strong brandy is added. These wines are at first very high coloured, firm, and too fiery, but when matured by keeping in cask and bottles, the brandy ceases to be tasted, their colour weakens, they become fine and delicate, and have spirit and flavour. The *Vinhos de Ramo*, among which some are very good, ferment a shorter time, and are less brandied; some even have none. But these wines are considered inferior, and form the common drink of the country. The best variety of Port in the Upper Douro is *Pezo de Regua*, and is considered superior to any other wine of the factory.

Although there are many other wines of Portugal, there are none of any great value, except those of Lisbon, which are known by the names of *Carcavellos*, from being grown between Oeiras and Carcavellos. They are sweet wines, and both of red and white colour, but the last is the most esteemed. *Setuval* is of two kinds, one called "dry" and the other "muscad." *Bucellas*, eighteen miles from Lisbon, furnishes the excellent white wines of that name. They are pure and resemble those of Barsac, but are stronger, containing 18.49 per cent. of alcohol, and are preferred to the dry wines of Setuval for exportation. The common wines of Lisbon are *Colares* and *Santarin*.

WINES OF GERMANY AND THE RHINE.

The German, Rhenish, or Hoek wines which are consumed in this country are produced on the banks of the Rhine and Moselle. They are generally used for dinner, being drier and more aromatic than the French, and some have an acidity which is unpleasant to most persons at first; but this is the case only with inferior sorts, or when there has been a bad vintage; for the produce of warm dry seasons is quite free from this defect, and always commands the highest prices. The district from which we receive the greatest supplies of Rhenish wines in this country is Mont Tonnerre; of these the following are among the finest:—*Deidesheim*, the best wine of the Palatinate, the whole produce of which is, in good seasons, bought up by the merchants of Frankfurt. The district of Spire furnishes the wines of *Roth*, *Königsbach*, *Hocheim*, *Weinheim*, *Forst*, and *Ungstein*; and in the district of Mayence, *Neivenstein*, *Laubenheim*, *Bodenheim*, *Oppenheim*, *Nackenheim*, and *Gaubischeim*, all of which are wines of the first quality. Those called *Scharlach* on Mount Scharlachenberg, *Leibfrauenmilch* made at

Worms, and the *Kæsterich* of Mayence are held in high repute, and command high prices. In Berg, *Rudesheim*, eighteen miles from Metz, produces the best wines of Germany, having more body, strength, and bouquet, than those on the left bank. The ancient chateau of Johanuesberg produces wines of equal quality, and highly esteemed for their choice flavour and perfume, and the absence of the least acidity. The *Steinberger* ranks next, and is a strong wine, improving by age. Both of these sorts are very rare, the district which produces them being extremely limited. The generality of Hocks consumed in Great Britain are grown on the banks of the Moselle, and some are of excellent quality, although they vary very much in this respect. They require keeping for five or six years in order to mellow.

The only other varieties of wine which are imported into this country in any quantity are those of the Cape of Good Hope, Madeira, the Canary Islands, and Sicily. *Cape Wines* have been very much improved of late years, and the consumption in this country is very great for the purpose of mixing with Sherries and Madeira. Much of the cheap sherry which is sold is either wholly, or in a great measure, the growth of the Cape, and may be known by its earthy, disagreeable taste, and its total want of aroma and flavour. The famed *Constantia* is grown in a small vineyard, divided into the high and low, situated at the foot of Table Mountain. It is very luscious, and is little inferior to the Muscadine of Languedoc; it contains 18·92 per cent. of alcohol. Another, called *Steen Wine*, resembles Rhenish, and contains 10·6 per cent. of alcohol. *Cape Muscat* is a sweet wine, and contains 18·25 per cent. of alcohol; and *Cape Madeira* has a harsh and earthy taste, and contains 20·51 per cent. of alcohol.

Madeira furnishes wines of two very distinct qualities, as they are grown on the north or south side of the island. The former are very excellent, but the latter are of an inferior description. *Malmsey Madeira* is a luscious sweet wine, made from over-ripe grapes grown in a rocky part of the island; but this is imported in very small quantities to this country, and is used principally as a liqueur, or at dessert. It keeps well, and improves by keeping. In the manufacture, the wine of the first pressure is kept separate, and called "Pingo," and the other, "Mosto." By some the whole is mixed together, and others keep them separate, to obtain wine of different qualities. An excellent white wine, made from the *Cercial* grape, is very fine and delicate, with a slight bitterness; it has a bouquet, which is perceptible on opening the bottle, and sparkles in the glass. A generous, perfumed, and agreeable red wine, made from the *Tinta* grape, is a strong astringent, and used against dysentery. Good samples of Madeira wine is luscious and rich, with a pungent, aromatic, nutty, and bitter-sweet flavour, and contains 22·27 per cent. of alcohol. Although this wine is naturally of a strong full body, considerable quantities of brandy are always added, in order to enable it to sustain the high temperature to which it is subjected on voyages to India, large quantities being put on board ships trading to the East Indies and China, for the purpose of ripening. Madeira wine is not considered to have arrived at maturity until it has been ten years in the wood, and twice that time mellowing in the bottle.

Teneriffe and *Canary* wines are of the kind called Malmsey, although the true Malmsey came originally from the Morea. The latter are inferior to the former, which are highly esteemed, and are generally known by the

name of *Malmsey*. Another variety is called *Vidonia*, and made from raisins before they are ripe,—whence their harshness and dryness. The wines of Teneriffe improve much by age, and become similar to Madeira, particularly when imported into warm climates.

Marsala wine is produced in the neighbourhood of Marsala, in Sicily, and differs considerably in quality; but of late years a good deal of attention has been paid to the cultivation of the lands and the improved manufacture of the wines, and it has now acquired a position from its improved character. It closely resembles the lighter sorts of Madeira, and is much cheaper.

We have now glanced at the principal varieties of the wines which are met with in this country, and shall at once proceed to make a few observations on their uses and abuses.

All wines, when used habitually in excess, are productive of bad consequences. Some constitutions are better able to resist their action than others, but on all they have an effect which, sooner or later, makes itself manifest. They weaken the stomach, produce disease of the liver, and give rise to dropsy, gout, apoplexy, tremours, and, not unfrequently, mania. Nevertheless, wine in moderation is sometimes productive of the best results. In convalescence from protracted fever it is frequently the best remedy that can be employed; and in certain stages of typhoid fevers, and in extensive ulceration and gangrene, either alone, or in conjunction with bark, it is often the physician's greatest reliance. *Sherry*, when in condition, is a fine wine, and being free from all acid, is to be preferred whenever the stomach is delicate, or has a tendency to dyspeptic acidity. Good *Madeira* is the most generous of the white wines, particularly adapted to the purpose of resuscitating debilitated constitutions, and of sustaining the sinking energies of the system in old age. However, the slight acidity of pure Madeira causes it to disagree with some stomachs, and renders it an improper wine for gouty persons. *Teneriffe* is a good variety of white wine, being of about a medium strength, and agreeing very well with most stomachs. *Rhenish wines* contain much free tartaric acid, and scarcely any malic or gallic acid, and are therefore less liable to ferment than many of the stronger wines. *Champagne*, and other sparkling brisk wines, intoxicate more freely than the stiller wines; but the morbid excitement is of short duration, and the subsequent exhaustion is comparatively trifling. In inflammatory constitutions, *Burgundy*, *Port*, and the stronger white wines, are to be avoided; but in diseases of debility, particularly where the stomach requires the aid of a tonic, these wines will prove beneficial.

Not the least important of all the products of the Vine is *Brandy*. This is obtained by distilling wines, and is dependent for its quality on the description of wines, or "mark," from which it is obtained. The different varieties of Brandy are distinguished from each other by their peculiar flavour or aroma, arising partly from the essential oil previously existing in the fruits from which they are made, and partly from products generated during the processes of fermentation and distillation; and hence it is that good judges can distinguish from what place, or fruit, any particular spirit has been obtained. When wines, or the "mark" of wines, is distilled, an essential oil accompanies the alcohol, called *Pousel Oil*, which imparts a peculiar, and usually disagreeable, taste and odour to the spirit. This oil

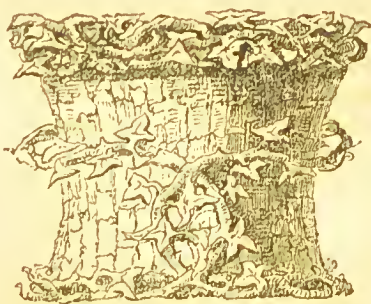
usually appears in greater quantity towards the end of the distillation, especially when a low temperature is employed, and hence may be obtained by distilling the residue after the alcoholic liquor has passed over. This oil is a clear liquid, of a highly penetrating odour, a sharp and very disagreeable taste; and a single drop introduced to fifteen gallons of well-flavoured brandy, will impart the fousel taste to it. *Cognac*, and other French brandies, owe their agreeable flavour to the small amount and less disagreeable nature of their fousel oil, so that the proper aroma of the wine is clearly perceptible in their odour and taste. *Ænanthic ether* is another constituent which imparts an agreeable aroma to wines, and passes into brandy. Brandy is distinguished by its colour into Pale and Brown. *Pale Brandy* has a yellow colour, derived from the cask in which it is kept. *Brown Brandy* has its deep red colour given to it by burnt sugar, which is said to impart a more agreeable flavour. *Spurious Brandy* is sometimes made by adding acetic acid to alcohol, deprived of fousel oil, and reduced to the proper proof by water, in the proportion of one or two drachms to the quart, the proper colour being given to it by burnt sugar. Another method is to dilute pure alcohol to the required strength, and add to it crude argol with a little brandy. This compound is then distilled with a gentle heat, and the product is flavoured with acetic ether, and coloured with burnt sugar, and an astringency is communicated by a few drops of tincture of catechu, or pure tannic acid. The addition of the brandy and crude argol introduces a portion of ænanthic ether, which, with the acetic ether, imparts the peculiar taste of genuine Cognac.

Another very important product of the Vine is the dried fruit which forms *Raisins* and *Currants*. There are several varieties of raisins known in commerce, but those which come from Spain are by far the best. The finest raisins are all made near Malaga. In the immediate vicinity the country is extremely rugged, but every spot, where it is possible to stick in a plant, is cultivated. For about six miles from the town there are few vineyards, in consequence of the rugged state of the country; but beyond that distance almost every hill is covered with vines, the produce of which is all converted into raisins. The grape which produces them is the *Large White Muscatel*, called *Muscatel Gordo*; and as it does not succeed in the interior, all the muscatel raisins are made within six miles of the coast. The *Lexia Raisins*, which are used for puddings, are made in the interior. For making raisins the gathering of the grapes commences about the middle of August, by selecting only such bunches as are ripe; after a week or two another gathering is made; and so on, for a third and fourth time. A place is always reserved in the vineyard, free from plants, on which to spread the grapes when gathered; and they choose a spot where the soil is of the darkest colour, in order to its keeping the full force of the sun's rays during the day, and retaining the heat during night. The bunches are spread out separately on the ground, and never allowed to press upon each other; but before they are spread out, the small grapes are picked out, as well as any that may happen to be injured, and the small ones are dried separately. They are only once turned over, and at the end of fifteen days they are generally sufficiently dry; when they are turned, any spoiled ones are picked out. Should they happen to get rain upon them while drying, the stalks become black or rusty-looking, instead of being of a bright light

brown. There are three distinct kinds of raisins. 1. The *Muscatel*, which are the finest, and are always packed in boxes of 25 lbs., and half and quarter boxes, containing respectively the half and quarter of that quantity. 2. *Sun*, or *Bloom Raisins*, which are prepared in the same manner as the *Muscatel*, but from a very large, long grape, called *Uva Larga*. These are generally packed in boxes, but sometimes in casks. Those in boxes are called "bunch raisins;" and the others, which are generally of an inferior quality, are separate from the stalks. The *Sun* or *Bloom Raisins* generally keep better than the *Muscatel*, and it is therefore this description which is sent to India. 3. The *Lexia Raisins* are packed in casks or grass mats, called "frails." These raisins are of an inferior kind, and require to be dipped in a lye (*lexia*) of wood ashes, with a little oil, before drying. The raisins in boxes are partly *Bloom* or *Sun*, but principally *Muscatel*. The barrels and frails are chiefly *Lexias*.

Currants, or *Corinths*, are the dried fruit of the small *Black Corinth* grape, which is extensively grown in Zante and Cephalonia; they are simply dried in the sun on the ground, and then packed into barrels.

The large green grapes which are met with in this country in the spring, and which arrive packed in oak saw-dust, also come from the vicinity of Malaga, where they are called *Loja*, from the place where they are cultivated. It is a large, oval, and coarse fleshy grape.



ORDER L.—PITTOSPORACEÆ—THE PITTOSPORUM FAMILY.

TREES, shrubs, or climbing shrubs. *Leaves* alternate, feather-nerved, entire, or more or less deeply divided, and without leaflets at the base. *Flowers* hermaphrodite, regular. *Calyx* with five deciduous, or three permanent, segments, either distinct or united at the base, with an imbricate æstivation. *Corolla* with five petals, hypogynous, with the claws conniving, sometimes united. *Stamens* five, hypogynous, distinct, and alternating with the petals, or numerous and united in one or many bundles. *Ovary* free, two-celled, or incompletely five-celled, with many ovules. *Style* simple. *Stigma* obtuse, or almost capitate; sometimes with two or four lobes. *Fruit*, Fig. A, a capsule, or a berry, with two or five incomplete cells. *Seeds* generally covered with glutinous or resinous pulp. *Embryo* minute, placed near the hilum in a fleshy *albumen*, with a rather long radicle, and short seed-leaves.

Fig. 73. *Pittosporum flavum*.

TRIBE 1. *Pittosporææ*.—Calyx with five deciduous segments. Stamens five, distinct.

Citriobatus, A. Cun.

Pittosporum, Sol.

Chelidospermum Zip.

Schoutensia, Endl.

Bursaria, Cav.

Senecia, Com.

GENERA AND SYNONYMS.

Oncosporum, Pull.

Marianthus, Hügel.

Cheiranthra, A. Cun.

Sollya, Lindl.

Pronaya, Hügel.

Spiranthera, Hook.

Campylanthera, Hook

Billardiera, Smith

Labillardiera, R. & S.

Stachyurus, S. & Z.

Koerberlinia, Zucc.

TRIBE 2. *Canelleææ*.—Calyx with three permanent segments. Stamens numerous, united in one or many bundles.

Canella, P. Br.

GENERA AND SYNONYMS.

„ *Winterana*, L.

Cinnamodendron, Endl.

GEOGRAPHICAL DISTRIBUTION.—This family is found plentifully in Australia, the islands of the Pacific, Japan, and the tropical parts of Asia; but rarely in Nepal, Mauritius, Cape of Good Hope, and the Canary isles.

PROPERTIES AND USES.—The whole family have resinous, aromatic, and bitter properties. The berries of *Billardiera* are eatable, and Mr. James Backhouse says that the fruit of *B. mutabilis* has a pleasant, sub-acid taste. The bark of *Pittosporum tobira* has a resinous smell.

Canella alba furnishes the drug called *Canella Bark*, which is the bark of the tree. It is a native of Jamaica, the Caribbee islands, and the woods on the mainland of South America. The tree is from fifteen to twenty feet high, and branched only at the top. Its branches are covered with a greyish, almost white bark; the leaves are entire, and not unlike those of a laurel. The flowers grow at the tops of the branches in bunches, and are of a violet colour, but very small, and seldom open. The fruit is a berry, round, black, and shining, and containing two or three black and shining seeds. The whole tree is very aromatic, and when in flower perfumes all the neighbourhood. The flowers dried, and softened again with water, have a fragrant odour, nearly approaching to that of musk. The leaves have a strong smell of laurel, and the berries are greedily eaten by the white-bellied and bald-pate pigeons, and communicate to their flesh the peculiar flavour it has. The bark comes to this country in the form of quills, occasionally somewhat twisted, of various sizes—from a few inches to two feet in length, and from half an inch to an inch and a half in diameter. In taste it is moderately warm, aromatic, and bitterish; its smell is agreeable, and resembles that of cloves. Boiling water extracts one-fourth of its weight, and the infusion, though bitter, has comparatively little of the pungency of the bark. To alcohol it yields a bright yellow tincture, which is rendered milky by the addition of water; and by distillation with water it affords a large proportion of a yellow or reddish, fragrant, and very acrid essential oil; besides which, it has been found to contain mannite, a peculiar, very bitter extractive, resin, gum, starch, albumen, and various saline substances. This bark has now superseded that called "Winter's bark." It is used as a local stimulant and gentle tonic, and produces on the stomach a warm cordial effect, which renders it useful as an addition to tonic and purgative medicines in debilitated states of the digestive organs. In the West Indies it is used by the negroes as a condiment, and has some reputation as an anti-scorbutic.



ORDER LI.—BREXIACEÆ—THE BREXIA FAMILY.

TREES with nearly simple stems. *Leaves* alternate, simple, without dots, and furnished with minute deciduous leaflets at the base. *Flowers* hermaphrodite, regular, arranged in umbels, which proceed from the axils of the leaves. *Calyx* inferior, small, permanent, with five segments, which are imbricate in æstivation. *Petals* five, hypogynous, also imbricate in æstivation. *Stamens* five, hypogynous, alternating with the petals, rising from a narrow cup, which is toothed between each stamen: *anthers* oval, innate, two-celled, bursting lengthwise. *Ovary* superior, five-celled, with numerous ovules attached in two rows to the axis. *Style* one, continuous, crowned by a simple *stigma*. *Fruit* a drupe, five-celled, many-seeded. *Seeds* numerous, horizontal, attached to the axis, and without *albumen*. *Embryo* with ovate obtuse cotyledons, and a cylindrical, centripetal radicle.

Fig. 74. *Brexia madagascariensis*.

GENERA AND SYNONYMES.

Ixerba, A. Cunn.
Brexia, Thouars.
Venana, Lam.

Argophyllum, Forst.
 Rousseau, Smith.
 Rousseau, DC.

„ Rousseau, R. & S.
 Rousseauvia, Boj.

GEOGRAPHICAL DISTRIBUTION.—The species of *Brexia* are found in Madagascar, *Ixerba* in New Zealand, *Argophyllum* in New Caledonia, and *Rousseau* in Mauritius.



ORDER LII.—LINACEÆ—THE FLAX FAMILY.

ANNUAL, perennial, and woody plants. site or whorled, entire, and without leaflets at the base. *Flowers* hermaphrodite, regular, blue, white, yellow, or red, and very fleeting. *Calyx* with five, rarely four, segments, distinct, or sometimes united at the base, and imbricate in æstivation, Fig. 54 B. *Corolla* with five or four petals, with a twisted æstivation, Fig. 54 C, clawed at the base, and inserted in the receptacle alternately with the segments of the calyx. *Stamens*, Fig. A, equal in number to the petals, and alternating with them; slightly united at the base, and with a tooth or abortive filament between each. *Ovary*, Fig. B, with five, rarely three or four, cells, each wholly or partially separated into two, by a complete or incomplete partition. *Styles* equal in number to the cells, generally distinct; *stigmas* capitate or linear. *Fruit*, Fig. C, a capsule, with one-seeded cells. *Seeds* ovate, compressed, shining, inverted, having a mucilaginous integument. *Albumen* very sparing, generally wanting. *Embryo* straight, flat, and fleshy, with the radicle turned towards the hilum, and with flat elliptical seed-leaves.

Leaves alternate, rarely oppo-

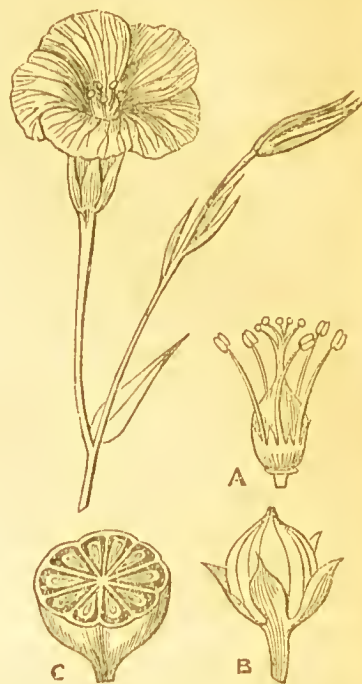


Fig. 75. *Linum usitatissimum*.

GENERA AND SYNONYMES.

<i>Linum</i> , L.	<i>Radiola</i> , Dill.
<i>Reinwardtia</i> , Dumort.	<i>Cliococca</i> , Bab.

GEOGRAPHICAL DISTRIBUTION.—The individuals of this family are distributed throughout the temperate regions of the whole globe; particularly in Europe and Africa, near the shores of the Mediterranean. They are frequently met with in North and South America, but are rare in Central Asia. One only is found in New Zealand, and none in Australia.

PROPERTIES AND USES.—The uses of Flax and of the seed are well known. The Common Flax, *Linum usitatissimum*, Fig. 74, is said to be originally from Egypt, but it is now naturalised throughout the whole of Europe, and in many parts of North America. From the stalk the well-known fibre called *Flax*, or *Lint*, is obtained, and from this is manufactured some of the coarsest and the finest fabrics—from the hard and board-like sails of a man-of-war, to the most delicate and gossamer-like cambrics. To obtain the fibre it is necessary that the flax should be steeped in water, to relieve it of the bark, or “hark,” by decay and putrefaction. The time occupied in doing this varies according to the state of the weather. In warm weather ten days are sufficient; but it is necessary to examine the

pools regularly every day after the seventh, lest the flax should rot, which sometimes happens when it is very warm. To follow the numerous and very varied processes which flax undergoes during its manufacture, would occupy more space than we can afford, and would, in all probability, tax the time and patience of our readers. It is a subject which, even to give a slight outline of it, would encroach too much on the legitimate object of this work; and we shall therefore best consult its interest, by leaving the information on such complicated manufactures to be dealt out by works specially devoted to these subjects. We may, however, by way of summary, state, that of all plants, the wheat only excepted, there is not in all the vegetable kingdom another which is so valuable to man. From it we derive all sorts of linen cloth, the most delicate fabrics, and the most costly lace. From it come the linen rags, with which paper is made; and through the medium of paper, printed with ink, the basis of which is linseed oil, the civilisation of the world has been carried on, and men are enabled to perpetuate their thoughts and diffuse information to the pleasure and benefit of others.

The seed of flax, called *Linseed*, yields by expression an oil called *Linseed Oil*. In its preparation on a large scale, the seeds are usually roasted before being pressed, in order to destroy the gummy matter contained in their exterior coating. The oil is thus obtained more free from mucilage, but more highly coloured, and more acrid than that obtained by cold expression. It differs from most other oils in having a tendency to consolidate and harden on long exposure to the air, and hence it is highly useful in painting, and in the manufacture of printers' ink. Used medicinally, it is laxative in a dose of a fluid ounce, but on account of its disagreeable taste it is seldom given internally. It has, however, been highly recommended as a cure for piles in the dose of two fluid ounces of the fresh oil every morning and evening. When the seed is ground it is called *Linseed Meal*, and is employed in emollient poultices to assuage the pain of inflamed tumors; and after being crushed and the oil expressed, the residue forms a cake, which has been long used as a nutritious and fattening food for cattle, as well as a valuable manure. *Linseed* is demulcent and emollient. The mucilage obtained by infusing the entire seeds in boiling water, in the proportion of half an ounce to the pint, is much and very advantageously employed in catarrh, dysentery, nephritic, and calculous complaints, stranguary and other diseases of the mucous membrane of the lungs, intestines, and urinary passages.

Linum catharticum, or *Purging Flax*, is in all its parts very bitter and somewhat acrid. It owes its activity to a peculiar drastic principle, which has received the name of *linin*, and which is afforded most largely by the plant after the flower has fallen. The plant is recommended as an excellent remedy in muscular rheumatism, catarrhal affections, and dropsy, with disease of the liver. From four to eight grains of the extract given twice or thrice daily are said to operate as a purgative and diuretic without inconvenience. Dr. Withering found two drachms or more in a dose of the dried herb useful in obstinate rheumatisms.

ORDER LIII.—OXALIDACEÆ—THE WOOD SORRELS.

HERBS, or undershrubs, rarely trees, with an acid juice. *Leaves* alter-



Fig. 76. *Oxalis elegans*.

nate, rarely opposite or in whorls, compound, and generally, though not always, without leaflets at the base. *Flowers* hermaphrodite, regular. *Calyx* with five almost equal segments, sometimes united at the base. *Corolla* with five distinct petals, sometimes united at the very base, with straight claws and spreading limbs, and twisted in æstivation, Fig. 54 c. *Stamens*, Fig. A, ten, united by their base, and the five alternate ones shorter than the others; *anthers* two-celled. *Ovary* free, five-angled and five-celled. *Styles* equal in number to the cells, thread-like, sometimes united at the base; *stigmas* capitate. *Fruit* a berry, with five one or many-seeded cells; or a capsule with five valves bursting lengthwise at the angles. *Seeds* few, fixed to the central axis of the cells, or enclosed in a fleshy aril, which bursts with elasticity at the apex and expels the seed at the end. *Albumen* cartilaginous, fleshy, and very thick. *Embryo* the whole length of the albumen, with a long radicle pointing to the hilum, and with leafy seed-leaves.

GENERA AND SYNONYMES.

<i>Oxalis</i> , L	<i>Ledocarpum</i> , Desf.	<i>Roucheria</i> , Planch.	<i>Hugonia</i> , L.
<i>Biophytum</i> , DC.	<i>Hyperum</i> , Presl.	<i>Wendtia</i> , Meyen.	<i>Sarcotheca</i> , Bl. [P.
<i>Averrhoa</i> , L.	<i>Durandea</i> , Planch.	<i>Martinieria</i> , Guill	<i>Rhynchotheca</i> , R. &

GEOGRAPHICAL DISTRIBUTION.—The Wood Sorrels are found plentifully in the tropical and south temperate parts of America, as well as at the Cape of Good Hope. They are thinly but widely diffused throughout the temperate parts of the whole world, but are excluded from the cold regions.

PROPERTIES AND USES.—The herbaceous parts of almost all the species are distinguished by a strong acidity, which is owing to the presence of a

small quantity of oxalate of potassa; but some are bitter and slightly stimulating. The fruit is reputed to be cooling, antiscorbutic, and antiseptic. The tubers of several are eatable, and contain a considerable quantity of starch; and the leaves of some are sensitive.

Oxalis acetosella, the *Common Wood-Sorrel*, or *Shamrock*, is a native of the moist, shady woods of this country, Europe, and North America, and is one of the most elegant wild-flowers there is. It delights in retired shady woods, groves, and hedges, and flowers in April and May. It was called by the old herbalists *Alleluja*, and *Cuckoo's Meat*, because, as Gerard says, "when it springeth forth, the cuckoo singeth most; at which time also Alleluja was wont to be sung in our churches." But Alleluja is merely a corruption of the Calabrian name Juliola. The whole plant has a grateful acid taste, much more so than the common sorrel, and is on that account used in salads and in sauces. In Lapland it is so plentiful, that Linnaeus says the inhabitants of that country take scarcely any other vegetable food than sorrel and Angelica. The expressed juice of the plant is employed to remove spots and iron-moulds from linen; and this it does by the great quantity of *binoxalate of Potassa* which it contains. Twenty pounds of the fresh leaves have been found to yield six pounds of juice, from which two ounces two drachms and one scruple of salt, besides two ounces and six drachms of an impure saline mass are obtained, and is sold under the name of *Salt of Sorrel* and *Essential Salt of Lemons*. It is prepared in Switzerland and Germany from different species of *Oxalis* and *Rumex* by the following process:—The plants, previously bruised, are macerated some days in water, and then submitted to pressure. The liquid thus obtained is mixed with clay, and occasionally agitated for two days. At the end of this time the clear liquor is decanted and evaporated, so that crystals may form when it cools. These are purified by solution and a new crystallisation. Five hundred parts of the plant afford four parts of the acidulous salt. The fresh plant eaten raw is said to be useful in scorbutic cases; and Dr. Beddoes says, "that the leaves and stalks wrapped in a cabbage-leaf, and macerated in warm ashes until reduced to a pulp, have been successfully applied to scrofulous ulcers. This poultice should remain on the sore for twenty-four hours, and be repeated four times. Afterwards the ulcer is to be dressed with a poultice made of the roots of the Meadow Sweet, bruised, and mixed up with the scum of sour butter-milk. The foliage of Wood Sorrel closes and droops at the approach of evening, and even when handled roughly in gathering, shrinks from the touch like the sensitive plant. *O. stricta*, a native of Jamaica is, according to Browne, cooling and diuretic, and was formerly administered in inflammatory cases, but has been little used since the more agreeable acid fruits have been cultivated in the West Indies. *O. carnosa*, a native of Chili, is said to be powerfully antiscorbutic. Some, such as *O. urtica* and *O. cernua*, have the singular property of producing bulbs about the size of a hazel nut in the axils of the lower leaves.

Oxalis crenata, introduced a few years ago from Peru, was expected to become an object of cultivation in this country for its tubers. These are, when cultivated, rarely ever more than two ounces in weight; and, although they are of a mealy consistency, and by some considered, if not equal, at least as a good substitute to the potatoe, it has not been found either advantageous or profitable to devote any attention to their culture as a vegetable. The

tubers are yellow, of the size and shape of small potatoes, farinaceous, and with a slight and pleasantly acid flavour; but the aggregate produce of a plant has not been found to exceed on the average more than half a pound. The succulent stalks of the leaves abound in a pleasant acid, and have been found to make an excellent and wholesome preserve. *O. Deppei*, a native of Mexico, was introduced in 1827, and has a root like a small parsnip, quite free from the acidity which is met with in *O. crenata*, and it is frequently cultivated in gardens as a culinary vegetable. Its tubers contain a considerable quantity of amylaceous matter of the nature of salep. *O. tuberosa* is called *Oca* in Bolivia, where it is a native, and cultivated extensively for its numerous tubers, which are like small potatoes, and about an inch in diameter. The tubers have a slightly acid flavour, which is disagreeable to most persons, but which they lose by exposing them to the sun, converting the acidity into saccharine matter. The *Oca* treated in this way loses all its acidity, and becomes as floury as the best varieties of potatoes. In Bolivia, the tubers are thus exposed for ten days in woollen bags, which appear to facilitate the conversion of the acid. If the action of the sun is continued for several months, the *Ocas* become of the consistence and sweet taste of dried figs, they are then called *Cani*. *O. sensitiva*, a native of Amboyna, is reported by Rumphius to be so delicately sensitive, that it will not bear the blowing of the wind upon it without contracting its leaves; and he very wittily remarks, that it is like a maiden, though common on every wayside, and may be looked at, is not to be touched. Its leaves are somewhat bitter, and slightly tonic and stimulating.

Acerrhoa carambola, is a tree about fourteen feet high, with a spreading head, a native of several parts of the East Indies, and now much cultivated in the tropics of South America. It bears fruit three times a year, from the age of three to fifty years. The flowers, which are bell-shaped, and variegated with purple and yellow, are eaten in the east in salads with lettuce in place of other herbs; they are also preserved with vinegar, to render them stronger, but then they are not so agreeable. The fruit is the size of a hen's egg, with five acute angles; a yellow, thin, smooth rind; and a clear watery pulp, in many sweet, in others acid, and without any smell. The fruit is cut in pieces and cooked with sugar and wine, or with skimmed milk, and form a very agreeable dish. When these fruits are ripe, they are excellent. They are met with in every garden in India, where the green fruit is used to make tarts, which taste very much like those made of gooseberries, and hence the British call them *Coromandel gooseberries*, but by the Portuguese they are called *Carambolas*. In Bengal the tree is called *Camruc* and *Camrunnga*, and in Malabar *Tamara-tonga*. Rhoede says that the root, leaves, and fruit are used medicinally, either alone or with arca or betel leaves, and that the fruit is used in dyeing, and for various economical purposes. A remarkable character is found in the leaves, or rather in the leaf-stalks of this tree. The leaves are pinnated with alternate leaflets and an odd one; and their common position in the daytime is horizontal, that is, in the same plane with the branch on which they grow. On being touched, they move downwards, frequently in so great a degree that the two opposite almost touch one another by their under sides, and the leaflets sometimes either come into contact or even pass each other. The whole of the leaflets of one leaf move, by striking the branch with the nail of the finger, or other

hard substance; or each leaflet can be moved singly, by making an impression which shall not extend beyond it. Thus the leaflets of one side of the leaf may be made to move one after another, whilst the opposite ones continue as they were; or they may be made to move alternately in any order by merely touching the leaflet intended to be put in motion. After sunset, the leaves go to sleep, first moving down so as to touch one another by their under sides; they, therefore, perform a greater motion at night of themselves than they can be made to do during day by external impressions. With a convex lens the rays of the sun may be collected on a leaflet, without causing any motion; but the same experiment performed on the petiole or footstalk of the leaf, the motion is as quick as if done by force, even although the rays be not so much concentrated as to cause pain on the bare hand. The leaves move very fast under the influence of an electric shock, even although very gentle. *A bilimbi*, or *Cucumber Tree*, is a native of Goa and other parts of the East Indies, and is now cultivated in South America. The tree is only about eight feet high, and produces a beautiful green, smooth, fleshy fruit, of the size and shape of a small cucumber. Rheede says, that the fruit, when ripe, is excellent to eat, but when unripe they are preserved with sugar, or vinegar and brine, and although it should be of an agreeable acid flavour when ripe, yet before they are ripe they are excessively sour. Burman says they contain a grateful acid juice, from which a syrup is made, and a conserve of the flowers, which are esteemed excellent in fevers and bilious disorders. Rumphius seems to think that, even when fully ripened, the fruit can never be eaten raw, but is only used to cook fish, fowl, and other viands, to give them an agreeable acidity, in the same way as we use sorrel and verjuice; they are pickled in brine and eaten as we do olives or capers in conjunction with meats; and preserved in sugar, or with a little saffron, they are recommended to be eaten by those who go sea voyages. *Hugonia mystax* is bitter, tonic, and stimulating; its root smells like violets, and is said to be diuretic, diaphoretic, and anthelmintic.



ORDER LIV.—BALSAMINACEÆ—THE BALSAMS.

TENDER and succulent annual plants. *Leaves* sometimes radical, but

more frequently cauline, either alternate or opposite, feather-nerved, and without leaflets at the base. *Flowers* hermaphrodite and irregular, issuing from the axils of the leaves. *Calyx* with five deciduous segments, which are petal-like and unequal; the two exterior lateral are opposite, and are close upon the two anterior, which are sometimes very small or wanting; the posterior one is very large, with its base drawn out in the form of a curved horn, or in a spur, and enveloping the corolla. *Corolla* with five petals, alternate with the segments of the calyx; the anterior is large and concave, the two posterior united with the two small lateral ones. *Stamens* five, united at the base, and closely girdling the ovary, alternate with the petals; *anthers* united by their edges, bursting lengthwise. *Ovary* free, with five many-ovuled cells; *stigma* almost sessile, entire, or with five lobes. *Fruit*. Fig. B, a capsule, with five many-seeded cells beneath, but one-celled above, and opening in five elastic valves, which curl over upon themselves from the base to the apex, inwards, as in *Balsamina*, and outwards, as in *Impatiens*. *Seeds* pendulous,



Fig. 77. *Impatiens Hookeriana*. A, B, C, Stamens, Fruit, and Flower of *Balsamina hortensis*.

without *albumen*. *Embryo* straight, with a superior radicle. *Seed-leaves* flat on the inside and convex on the outside.

GENERA AND SYNONYMES.

Impatiens, *L.*Balsamina, *Gærtn.*Hydrocera, *Blume*Tytenia, *Don.*

GEOGRAPHICAL DISTRIBUTION.—These are found in the humid and shady places in the temperate and colder regions of Asia; few are met with in Africa and in North America, and only one in Europe.

PROPERTIES AND USES.—All the Balsams abound in a watery juice. *Impatiens noli tangere* was regarded by Ray as a dangerous diuretic, and by Boerhaave as poisonous. It has an acrid, burning taste, and when taken internally acts as an emetic, cathartic, and diuretic, but is considered dangerous, and therefore little used. Dr. Ruau, of Philadelphia, used it with great success in piles, in the form of an ointment made by boiling the plants in their recent state in lard. The seed-vessels of this, as well as all the other species, possess considerable elasticity when ripe, and on being touched throw out the seed with force; hence the plant has been called *Quick-in-hand* and *Touch-me-not*. The beautiful balsams of our gardens are varieties of *Balsamina hortensis*. It is a native of China, Cochin China, and other parts of the East, and was introduced to this country in 1596. The Japanese are said to use the juice with alum to dye their nails red. The inhabitants of Cochin China use a decoction of the leaves of *B. cornuta* as a wash to their head and hair, to which it gives a very sweet odour.



ORDER LV.—GERANIACEÆ—THE CRANESBILLS.

HERBS, or soft-stemmed shrubs, with the young stems jointed, and separable at the joints, as in the Vines. The inferior *Leaves* are opposite; the superior often alternate, simple, entire, or more or less deeply divided, and furnished with membranous leaflets at their base. *Flowers* hermaphrodite, regular, or irregular. *Calyx* with five equal segments, as in *Geranium*; or unequal, by one of them being elongated into a hollow spur at the base, and closely united to the peduncle, as in *Pelargonium*. *Corolla* with five petals, sometimes equal, as in *Geranium*, sometimes unequal, and then occasionally reduced to four, or even two, by abortion, as in *Pelargonium*; they are clawed, and alternate with the segments of the calyx, and are either inserted in the receptacle (hypogynous), or in the calyx (perigynous). *Stamens*, Fig. A, ten, as in *Geranium*, seven, as in *Pelargonium*, or only five, as in *Erodium*, and more or less united by their filaments at their base, and either hypogynous or perigynous. *Ovary* free, formed of five two-ovuled carpels, distinct, and placed round a central axis, which is an elongation of the receptacle, and to which they adhere by a style or awn. *Fruit*, Fig. B, dry, composed of five one-seeded shells arranged round the axis, and attached to the elongated receptacle by their styles, which, when at maturity, contract, and twist variously from the base to the apex, and by their elasticity carrying the seeds along with them. *Seeds* solitary, pendulous, without *albumen*. *Embryo*, Fig. C, curved, with a radicle pointing to the base of the cell, with leafy, convolute, or plaited seed-leaves.

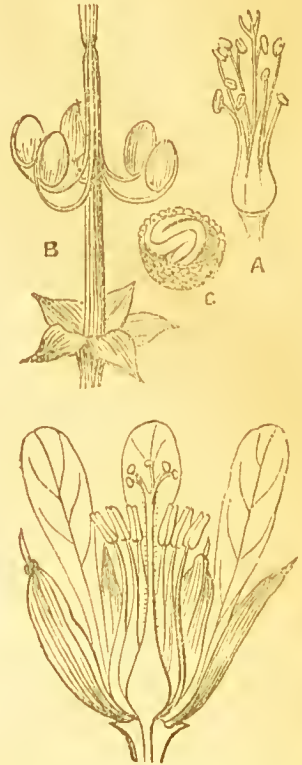


Fig. 78. Section of flower of *Geranium robertianum*. A, Stamens. B, Fruit. C, Section of seed.

GENERA AND SYNONYMES.

Erodium, Herit.
Scolopacium, E. & Z.
Geranium, Herit.
Monsonia, L. f.

Sarcocaulon, DC.
Pelargonium, Herit.
Isopetalum, E. & Z.
Cortusina, E. & Z.

Eumorpha, E. & Z.
Calliopsis, Sweet.
Hypseocharis, Remy.

GEOGRAPHICAL DISTRIBUTION.—These are inhabitants of temperate regions of both hemispheres. The woody species are all from the Cape of Good Hope and southern Africa, and the *Pelargonium* has been found in Australia. The herbaceous are found principally in Europe, Northern Asia, and North America.

PROPERTIES AND USES.—The distinguishing character of this family is astringency, the presence of tannin and gallic acid, and a quantity of resin and an essential oil.

Erodium Moschatum (the *Musky Heron's-bill*) smells strongly of musk, and an infusion of it has been considered slightly exciting and antispasmodic. It has sometimes been employed as a diaphoretic, but its use is now entirely disregarded. *Herb Robert* (*Geranium Robertianum*) exhales a strong and disagreeable odour, which is said to be offensive to bugs. The whole plant has a disagreeable, bitterish, astringent taste, and imparts its virtues to boiling water. It has been used internally in intermittent fever, consumption, hemorrhages, jaundice, and other diseases. It has also been employed as a gargle in affections of the throat, and, applied externally, it has been found beneficial as a resolvent to swollen breasts and other tumours. A decoction of it has been given in cases of calculus. The root of *Geranium maculatum*, called in the United States *Alum Root*, from its powerful astringency, may be employed for all the purposes to which astringent medicines are applied. It has no unpleasant taste or offensive qualities, which render it peculiarly serviceable in the cases of infants and of persons with weak stomachs. Diarrhœa, chronic dysentery, and various hemorrhages, are the forms of disease in which it is commonly administered, and with greatest advantage. As an application to indolent ulcers, an injection in leucorrhœa and gleet, a gargle in relaxation of the uvula and aphthous ulcerations of the throat, it answers the same purpose as kino, catechu, and other remedies of a similar character. It is a popular domestic remedy in various parts of the United States, and is said to be employed by the Indians in numerous disorders. The tubers of *G. tuberosum* are eaten in southern Europe, where they grow naturally, and are considered strengthening; and those of *G. parviflorum* are eaten by the natives of Van Diemen's Land, where it is called *Native Carrot*.

From *Pelargonium roseum* and *P. capitatum* an essential oil is distilled, which serves to adulterate Oil of Roses. The tubers of *P. anti-dysentericum* are eaten by the Namaquas as a remedy against diarrhœa. The leaves of *P. acetosum* and *P. peltatum* are charged with a grateful acid, and the tubers of *P. triste* are eatable. The stem of *Monarda speciosa* abounds in a resinous balsam, which burns like a torch, and in combustion gives out a pleasant odour.



ORDER LVI.—TROPÆOLACEÆ—INDIAN CRESSES.

ANNUALS or perennials, with smooth, tender, trailing, or twining stems,

and with an acrid juice; roots sometimes tuberous.

Leaves alternate, simple or divided, peltate or lobed, and without leaflets at their base.

Flowers hermaphrodite, irregular, solitary, and issuing from the axils of the leaves.

Calyx with five unequal coloured

divisions, the upper segment furnished at the base with a free, hollow spur, which is open to the interior of the flower, and the segments are sometimes free and sometimes more or less united. Corolla with five unequal petals, inserted in the calyx and alternating with its lobes; the two upper ones sessile and remote, fixed in the mouth of the spur; the three lower ones clawed, smaller, and sometimes abortive. Stamens eight, free, closely girding the ovary at their base, and inserted in the receptacle. Anthers oblong, terminal, bursting by a double chink. Ovary free, three-lobed, with three one-ovuled cells; ovules pendulous. Style simple, terminated by three to five stigmas. Fruit, Fig. A, composed of three dry or somewhat fleshy carpels, united round the base of the style or axis of the fruit, one-seeded, and unopening. Seeds large, without albumen, filling the cell. Embryo large, with two straight, thick seed-leaves, either distinct or closely connected together; radicle next the hilum.

GENERA.

Chymocarpus, Don.
Tropæolum, L.

Magallana, Cav.
Rixia, Morren.



Fig. 79. *Tropæolum Deck-
erianum*. A, Fruit of *T.*
majus.

GEOGRAPHICAL DISTRIBUTION.—The Indian Cresses are all natives of South America.

PROPERTIES AND USES.—The *Indian Cress* (*Tropæolum majus*) has an acrid, pungent taste, is possessed of tonic and stimulant properties, and, administered to women and children with weak constitutions, is an excellent mild antiscorbutic, much too little used. The flowers, which

make such a beautiful show in gardens during summer, are frequently employed to garnish and flavour salads; and the seeds, when green, form an excellent pickle when preserved in vinegar. The tubers of *T. tuberosum*, when cooked, are eaten by the natives of Peru. They have also been tried in this country, and been considered by some to form an agreeable dish. When boiled, they are of a soft, pulpy substance, and in flavour resemble sea-kale, mixed with the hot taste of garden cress. Some who have thus used them state that they have a very delicate flavour, like the richest asparagus, and superior to the potatoe, but they are disposed to be watery, and not to boil firm. It has been found that, when used immediately after being taken up, the tubers have a disagreeable taste; and to remedy this, in Bolivia, where the plant is called *Ysano*, they freeze them after they are cooked, and eat them when frozen. The ladies of La Paz are very fond of them, and in the season of the *taiachas* large quantities are sopped in molasses, and taken as refreshments during the heat of the day. The beautiful *Canary Plant* (*T. peregrinum*) is now well known, and has become an established favourite with all who cultivate their own gardens.



ORDER LVII.—LIMNANTHACEÆ—THE LAKE FLOWERS.

HERBACEOUS annuals. *Leaves* alternate, much divided, with long foot-stalks, and without leaflets at their base.



Fig. 80. *Limnantes rosea*.

Flowers hermaphrodite, regular, solitary, on long foot-stalks issuing from the axils of the leaves. *Calyx* with three or five segments, permanent, with a valvate aestivation, Fig. 50 E. *Corolla* with petals equal in number to the segments of the calyx, alternate with them, and inserted close to, and apparently united with them at the base. *Stamens* six to ten, inserted with the petals, and therefore between hypogynous and perigynous. *Filaments* distinct; the three or five which are opposite the segments of the calyx are each furnished with a gland outside at the base. *Ovaries* from two to five, opposite the segments of the calyx, and arranged round the base of the style. one-celled and one-

seeded; *ovule* erect, inverted. *Style* two to five, cleft at the apex; *stigma* simple, acute, or minutely capitate. *Fruit* composed of three to five rather fleshy seed-nuts, often two by abortion, one-seeded. *Embryo* straight, without *albumen*; *radicle* inferior, very short. *Seed-leaves* fleshy, plano-convex.

GENERA.

Flörkca, W.

|

Limnantes, R. Br.

GEOGRAPHICAL DISTRIBUTION.—Found in marshy places in North America.

PROPERTIES AND USES.—*Limnantes* has in all its parts the same acrid taste as *Tropæolum*.

ORDER LVIII.—ZYGOPHYLLACEÆ—BEAN CAPERS.

SHRUBS, herbs, and trees. *Leaves* opposite, pinnated, rarely simple, furnished with leaflets at their base. *Flowers* hermaphrodite, regular. *Calyx* with four or five segments, sometimes slightly united at the base. *Corolla* with four or five petals, alternating with the segments of the calyx; clawed, and inserted into the receptacle. *Stamens* eight to ten, distinct, widened at the base, usually inserted on the back of a hypogynous scale, five opposite the petals, and five opposite the segments of the calyx. *Ovary*, Fig. A, simple, composed of two, three, or five carpels, more or less united to each other and to the central axis; *ovules* two or more in each cell. *Style* simple, with four or five divisions at the top, each terminated by a simple *stigma*. *Fruit*, Fig. B, capsular, dividing into five spiny seed-nuts, as in *Tribulus*, unopening, and separating into one-seeded cellules; or opening in two or five valves, which leave the central axis remaining, as in *Zygophyllum*; rarely fleshy, with four or five, one or few, seed-cells. *Seeds* with or without *albumen*; in the New Holland species it is present, and in those of the Cape it is wanting. *Embryo* straight, green, with a superior radicle; *seed-leaves* leafy.



Fig. 81. *Tribulus cistoides*.

TRIBE 1. *Tribuleæ*.—Seeds without albumen.

GENERA AND SYNONYMES.

<i>Tribulus</i> , <i>T.</i>	„ <i>Ehrenbergia</i> <i>Mart</i>	„ <i>Heterozygis</i> <i>Bung</i>	<i>Tribulopsis</i> , <i>R. Br.</i>
<i>Kallströmia</i> , <i>Scop.</i>			

TRIBE 2. *Zygophylleæ*.—Seeds albuminous.

GENERA AND SYNONYMES.

<i>Chitonia</i> , <i>M. & S.</i>	<i>Fagonia</i> , <i>T.</i>	<i>Fabago</i> , <i>T.</i>	<i>Plectrocarpa</i> , <i>Gill.</i>
<i>Juliania</i> , <i>L. & L.</i>	<i>Röpera</i> , <i>A. J.</i>	<i>Trichanthera</i> <i>Ehren.</i>	<i>Guaiacum</i> , <i>Plum.</i>
<i>Malacocarpus</i> , <i>F. & M.</i>	<i>Sarcozygium</i> , <i>Bung.</i>	<i>Eurynema</i> , <i>Endl.</i>	<i>Seetzenia</i> , <i>R. Br.</i>
<i>Peganum</i> , <i>L.</i>	<i>Sericodes</i> , <i>A. Gray.</i>	<i>Larrea</i> , <i>Cav.</i>	<i>Melianthus</i> , <i>L.</i>
<i>Harmala</i> , <i>Mönch.</i>	<i>Zygophyllum</i> , <i>L.</i>	<i>Porlieria</i> , <i>R. & P.</i>	

GEOGRAPHICAL DISTRIBUTION.—The Bean Capers are found plentifully in the temperate regions of both hemispheres. From the north-west of Africa, along the shores of the Mediterranean, and extending over the north of India and the south of Siberia, they are particularly abundant; between the tropics, at the Cape of Good Hope, in Australia and America, they are more rare.

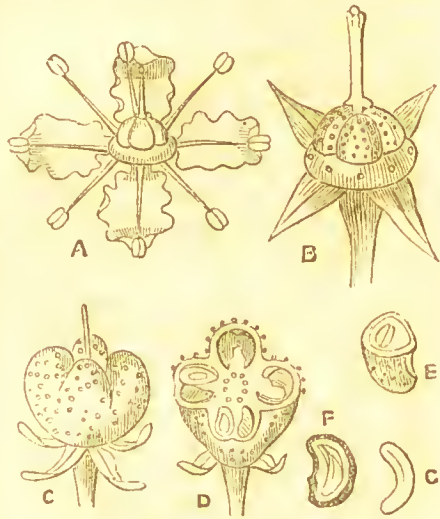
PROPERTIES AND USES.—The wood and bark of the individuals of this family contain a resinous substance, which has bitter and acrid properties. The wood of the ligneous species is extremely hard.

Tribulus, or *Caltrops*, is remarkable for the long, sharp spines with which the fruit of some of the species are armed, and that of *T. terrestris*, which is very common in cultivated lands in the south of Europe, is very troublesome to cattle, by running into their feet. *T. cistoides*, Fig. 81, is a very pretty plant, a native of South America and the West Indies, where it is cultivated for the sake of its flowers, which yield a pleasant smell, and are highly ornamental. These are called "Caltrops," from their spiny fruit resembling the calcitrapa, which were used in ancient warfare to run into the feet of the enemy's cavalry. *Zygophyllum fabago*, or *Common Bean Caper*, is considered anthelmintic and anti-syphilitic, and the flowers are sometimes used as a substitute for capers. *Z. simplex*, a native of the deserts of Arabia and Egypt, is called by the Arabs *Carmal*, and an infusion of the bruised leaves is used by them for removing specks in the eyes. The seeds of *Peganum harmala*, or *Syrian Rue*, are said to possess narcotic properties, and Bellonius relates that the Emperor Solymán kept himself intoxicated by eating them. They are still used by the Turks as a spice, and for dyeing red. The leaflets of the leaves of *Portieria hygrometrica* contract before the approach of rain.

The most important plant of the family is *Guaiacum officinale*, the *Lignum Vitæ*, or *Guaiacum*. This is a native of the West Indies, particularly of Hayti and Jamaica, and the warm parts of the continent of America. The tree is about thirty feet high, and about a foot in diameter at the base. The wood is known in this country as *Brazil Wood* and *Lignum Vitæ*. It has a peculiar aromatic smell when rubbed or heated, and is so hard and heavy that it sinks in water, and breaks the tools used in felling it; it is therefore little used as firewood, but the sugar-planters find it excellent for making wheels and cogs for the mills. It is brought over to this country in pieces weighing four or five hundred weight each, and from its beauty and hardness, is in request for various articles of turnery ware. The tree yields a resin known in the *Materia Medica* as *Gum Guaiacum*. This gum is obtained by wounding the bark; and the tree also yields a spontaneous exudation, which is called "native gum," which is in small irregular pieces, of a bright semi-pellucid appearance. But the way in which it is generally procured is to cut the wood into billets, which are bored longitudinally with an auger, and being set on fire at one end, the resin runs out at the other. The gum is stimulant and alterative, producing, when swallowed, a sense of warmth in the stomach, promoting various secretions, and is highly beneficial in rheumatism and gouty affections. The wood, which is used in the form of shavings or raspings, is stimulant and diaphoretic, and is useful in chronic rheumatism, gout, scrofulous affections, cutaneous eruptions, and other diseases dependent on a depraved or vitiated condition of the system.

ORDER LIX.—RUTACEÆ—THE RUE FAMILY.

PERENNIAL or suffruticose plants, rarely herbaceous. *Leaves* alternate, much divided, rarely entire, often covered with pellucid dots or resinous tubercles, and without leaflets at their base. *Flowers*, Fig. A, hermaphrodite, regular, arranged in corymbs or racemes. *Calyx*, Fig. B, with four or five segments united, and with an imbricate æstivation. *Corolla*, Fig. A, with four or five distinct petals inserted in the base of a fleshy-glandular disk. *Stamens* double the number of the petals, and inserted with them in two series—the one a little exterior and opposite the sepals, the other opposite the petals; *filaments* free, generally widened at the base; *anthers* opening inwards, two-celled. *Ovary* deeply two, three, or five-lobed, two, three, or five-celled, placed round the base of the axis on a glandular fleshy disk; *ovules* two or four, or more, in each cell, either collateral, or one above the other; *style* simple; *stigma* three, four, or five cleft. *Fruit*, Fig. C, D, a capsule, with three, four, or five many-seeded cells opening by the back of the carpels, or in four or five shells, opening at the summit or internal margin. *Seeds*, Fig. E, F, furnished with *albumen*. *Embryo*, Fig. C, curved or straight, with a cylindrical superior radicle.

Fig. 82. *Ruta graveolens*.

GENERA.

Biebersteinia, Steph. | *Böninghausenia*, Rehb. | *Ruta*, L. | *Haplophyllum*, A. Juss

GEOGRAPHICAL DISTRIBUTION.—The Rues are all found in the temperate regions of the northern hemisphere, and plentifully along the shores of the Mediterranean, extending to the confines of Siberia. Towards the pole and the equator they diminish in numbers.

PROPERTIES AND USES.—The *Common Rue* (*Ruta graveolens*), which is the type of this family, is well known. It is also called *Herb of Grace*, and *Countryman's Treacle*, and was held in high estimation by the old herbalists for its reputed virtues. The plant has a strong disagreeable odour, and is bitter, hot, and acrid, and when fresh blisters the skin, if much handled. Its virtues depend on a volatile oil, which is very abundant, and is contained in glandular vesicles apparent over the whole surface of the plant. Rue is stimulant and anti-spasmodic, and like most other substances which excite the circulation, occasionally increases the secretions, especially when they are deficient from debility. *R. montana* is so acrid that it blisters the hands, and produces erysipelas and pustulous ulcers when applied to the head. The leaves of *Haplophyllum tuberculatum*, bruised in water, are used by the Egyptian women for washing their hair, in order to make it grow.

ORDER LX.—DIOSMACEÆ—THE DIOSMA FAMILY.

SMALL trees or shrubs, rarely herbs. *Leaves* alternate, sometimes oppo-



Fig. 83. *Eriostemon intermedius*. A, Fruit of *Diosma*.

site, simple, ternate, or unequally pinnated, frequently covered with pellucid glandular dots, which contain a fragrant-essential oil. *Flowers* hermaphrodite, very rarely unisexual. *Calyx* with four or five segments. *Corolla* with four or five petals, inserted on the disk, either free or united at the base with the calyx, and with the segments of which they are alternate. *Stamens* four or five, inserted with the petals and alternating with them, either hypogynous or perigynous, generally distinct, rarely united in a tube or adherent to the petals; *anthers* opening inwards, two-celled. *Ovaries*, Fig. A, four or five, free, or more or less united at the base, but always free at the apex, and either embedded in the disk, or raised on a pedicel (gynophore); one-celled. *Style* simple, or deeply divided in four or five branches, each terminated by a globular *stigma*.



Fruit composed of from three to five one-seeded cells, rarely single. *Seeds* oblong, or somewhat kidney-shape, generally furnished with a fleshy *albumen*. *Embryo* straight, or somewhat curved, with plane or plaited seed-leaves, and a superior radicle.

TRIBES 1. *Cuspariæ*.—Flowers regular or anomalous; petals free, or combined into a two-lipped or funnel-shaped corolla. *Stamens* free, or adhering to the corolla, some of them sterile. *Ovules* two, placed one upon the other. *Styles* connected at top or bottom, but usually in one. *Disk* urceolate, girding the ovaries. *Albumen* wanting. *Leaves* alternate, rarely nearly opposite, sometimes simple, but generally trifoliate.

GENERA AND SYNONYMES.

<i>Spiranthera</i> , <i>St. Hil.</i>	<i>Galipea</i> , <i>St. Hil.</i>	„ <i>Bonplandia</i> , <i>W.</i>	„ <i>Lasiostemon</i> , <i>N.</i>
<i>Terpanthus</i> , <i>N. & M.</i>	<i>Raputia</i> , <i>Aubl.</i>	<i>Angostura</i> , <i>R. & S.</i>	[& <i>M.</i>
	<i>Pholidandra</i> , <i>Nck.</i>	<i>Conchocarpus</i> , [Mik.]	<i>Obentonia</i> , <i>Velloz</i>
<i>Almeidea</i> , <i>St. Hil.</i>	<i>Sciuris</i> , <i>Schreb.</i>		<i>Dangervilla</i> , <i>FLF.</i>
<i>Aruba</i> , <i>N. & M.</i>	<i>Cusparia</i> , <i>Humb.</i>	<i>Ravia</i> , <i>N. & M.</i>	<i>Rossenia</i> , <i>Fl. Fl.</i>

<i>Diglossis</i> , <i>N. & M.</i>	<i>Ticorea</i> , <i>Aubl.</i>	<i>Sciuris</i> , <i>N. & M.</i>	<i>Monnicria</i> , <i>L.</i>
<i>Erythrochiton</i> , <i>N. & M.</i>	<i>Ozophyllum</i> ,	<i>Costa</i> , <i>Fl. Fl.</i>	<i>Aubletia</i> , <i>Rich.</i>
[<i>M.</i>]	[<i>Schreb.</i>]	<i>Lemonia</i> , <i>Lindl.</i>	

TRIBE 2. *Pilocarpeæ*.—Flowers regular; petals free. Stamens equal, rarely double the number of the petals, all fertile. Disk surrounding the ovaries, or wanting. Ovules two, either collateral or placed one above the other. Styles connected, crowned by as many lobes as there are cells or carpels. Albumen fleshy, rarely wanting. Leaves alternate or opposite, simple, bifoliate or trifoliate. Natives of America.

GENERA AND SYNONYMES.

<i>Melicope</i> , <i>Forst.</i>	<i>Esenbeckia</i> , <i>Knth.</i>	<i>Polembryum</i> , <i>A. J.</i>	<i>Hortia</i> , <i>Vand.</i>
<i>Entognum</i> , <i>Bks.</i>	<i>Colythrum</i> , <i>Sept.</i>	<i>Metrodorea</i> , <i>St. Hil.</i>	<i>Choisya</i> , <i>Knth.</i>
<i>Evodia</i> , <i>Forst.</i>	<i>Evodia</i> , <i>St. Hil.</i>	<i>Pilocarpus</i> , <i>Vahl.</i>	<i>Geijera</i> , <i>Sept.</i>
<i>Rabelaisia</i> , <i>Pl.</i>			

TRIBE 3. *Boronieæ*.—Flowers regular; petals four to five. Stamens eight to ten, hypogynous, all fertile. Ovaries distinct or connected. Ovules two, placed one above the other. Styles joined. Disk wanting. Albumen fleshy, abundant. Embryo straight. Leaves opposite or alternate, simple, rarely ternate or unequally divided. Natives of Australia.

GENERA AND SYNONYMES.

<i>Zieria</i> , <i>Sm.</i>	<i>Croiwea</i> , <i>Sm.</i>	<i>Diploana</i> , <i>R. Br.</i>	<i>Correas</i> , <i>Hoff.</i>
<i>Boronia</i> , <i>Sm.</i>	<i>Philotheca</i> , <i>Rudge.</i>	<i>Correa</i> , <i>Sm.</i>	<i>Antomarchia</i> ,
<i>Cyanothamnus</i> ,	<i>Phebalium</i> , <i>Vent.</i>	<i>Mazcutoxeron</i> ,	[<i>Aub.</i>]
[<i>Lindl.</i>]	<i>Didymeria</i> , <i>Lindl.</i>	[<i>Lab.</i>]	<i>Hügelia</i> , <i>R. Br.</i>
<i>Eriostemon</i> , <i>Sm.</i>	<i>Choricena</i> , <i>Endl.</i>		

TRIBE 4. *Endiosmeæ*.—Flowers regular; calyx five-parted. Petals five. Disk adhering to the calyx. Stamens perigynous. Ovaries one to five, connected. Ovules two, either collateral or placed one upon the other. Albumen very thin, or wanting. Leaves alternate or opposite, simple. Natives of the Cape of Good Hope.

GENERA AND SYNONYMES.

<i>Pachystigma</i> , <i>Hook.</i>	<i>Glandulifolia</i> ,	<i>Enchatis</i> , <i>Bart.</i>	<i>Agathosma</i> , <i>W.</i>
<i>Peltostigma</i> ,	[<i>Wendl.</i>]	<i>Aemadenia</i> , <i>Bart.</i>	<i>Bucco</i> , <i>Wendl.</i>
[<i>Wlp.</i>]	<i>Ockenia</i> , <i>Dietr.</i>	<i>Barosma</i> , <i>W.</i>	<i>Dichosma</i> , <i>DC.</i>
<i>Calodendron</i> , <i>Th.</i>	<i>Hankia</i> , <i>Smith.</i>	<i>Baryosma</i> , <i>Röm.</i>	<i>Macrostylis</i> , <i>Bart.</i>
<i>Pallasia</i> , <i>Houtt.</i>	<i>Coleonema</i> , <i>Bart.</i>	<i>Parapetalifera</i> ,	<i>Empleurum</i> , <i>Sol.</i>
<i>Adenandra</i> , <i>W.</i>	<i>Diosma</i> , <i>Berg.</i>	[<i>Wendl.</i>]	

TRIBE 5. *Dictamnææ*.—Flowers irregular; petals five. Stamens hypogynous, double the number of the petals, all fertile. Disk wanting. Ovaries five, distinct. Ovules four. Albumen fleshy.

GENUS AND SYNONYME.

Dictamnus, *L.*
Fraxinella, *T.*

TRIBE 6. *Xanthoxyleæ*.—Flowers unisexual; petals inserted in the base of the gynophore, sometimes wanting. In the male flowers the stamens are inserted with the petals, and the rudiment of the germ is set upon a

stipe; in the female flowers the ovaries are raised upon a pedicel (gynophore). Ovules two, rarely four, in a cell. Fruit sometimes winged. Embryo in a fleshy albumen.

GENERA AND SYNONYMES.

Pitavia, <i>Molin.</i>	Kampmannia,	Scopolia, <i>Sm.</i>	Gela, <i>Lour.</i>
Galvesia, <i>R. & P.</i>	[<i>Raf.</i>	Crantzia, <i>Scherb.</i>	Laxmannia, <i>Sm.</i>
Brunellia, <i>R. & P.</i>	Pentamone, <i>M. &</i>	Dipetalum, <i>Dalz.</i>	Doriena, <i>Don.</i>
Xanthoxylon, <i>Knth.</i>	[<i>S.</i>	Vepri, <i>Comm.</i>	Aspidostigma, <i>Hst.</i>
Zanthoxylon,	Langsdorfia,	Asaphes, <i>DC.</i>	Teclea, <i>Del.</i>
[<i>Gold.</i>	[<i>Leandr.</i>	Boscia, <i>Th.</i>	
Fagara, <i>Adans.</i>	Maqueria, <i>Com.</i>	Duncania, <i>Rchb.</i>	Pseudosma, <i>A. J.</i>
Pterota, <i>P. Br.</i>	Typelia, <i>Dennst.</i>	Ptelea, <i>L.</i>	Tetradium, <i>Lour.</i>
Iacaris, <i>Hamill.</i>	Blackburnia, <i>Frst.</i>	Bellucia, <i>Ad.</i>	Philagonia, <i>Bl.</i>
Tobinia, <i>Desv.</i>	Boymia, <i>A. J.</i>	Acronychia, <i>Frst.</i>	Phellinc, <i>Lab.</i>
Ochroxylum, <i>Schr.</i>	Cyclocarpus, <i>Jung.</i>	Cyminosma, <i>Gärtl.</i>	Guindilia, <i>Gill.</i>
Curtisia, <i>Schr.</i>	Toddalia, <i>Juss.</i>	Jambolifera, <i>L.</i>	

GEOGRAPHICAL DISTRIBUTION.—The greatest number of this family is found in southern Africa and in Australia, few in tropical America, and rarely in Asia. Except *Dietamnus*, none are found in Europe.

PROPERTIES AND USES.—These all contain a peculiar bitter principle, an essential oil, and resin. The *Cuspariæ* and *Pilocarpeæ* particularly contain a bitter subcaloid principle. The *Eudiosmeæ* are remarkable for their essential oil and resin.

Cuspariæ.—In this tribe we find *Galipea cusparia*, which is said by Humboldt and Bonpland to furnish the *Angustura Bark* of the shops. There is, however, a diversity of opinion on this subject. Dr. Hancock, who resided in the country where the bark is produced, thinks that the tree which yields it, though of the same genus, is not the same species as *G. cusparia*, as that grows to the height of eighty feet, while that from which he had seen the bark taken is never higher than twenty feet. He therefore proposes that the latter should be distinguished by the name of *G. officinalis*. The tree grows abundantly on the mountains of Carony, on the Orinoco, two hundred miles from the sea. It is generally about twelve or fifteen feet high, with an erect stem from three to five inches in diameter, and covered with a smooth greyish bark. The leaves are from six to ten inches long, smooth and glossy, and have an odour resembling tobacco. The flowers are white, and have an unpleasant smell. The smell of *Angustura Bark* is peculiar and disagreeable when fresh, but becomes fainter with age; the taste is bitter and slightly aromatic, leaving a sense of pungency at the end of the tongue. It contains volatile oil, bitter extractive, a hard and bitter resin, a soft resin, a substance analogous to caoutchouc, gum, lignin, and various salts. The volatile oil, which may be obtained by distillation with water, is of a pale yellowish colour, lighter than water, of an acrid taste, and with the odour of the bark. The virtues of the bark are probably due to the volatile oil and a bitter principle, which has been called by Saladin *Cusparin*. It is in the shape of tetrahedral crystals, and is neutral; fusible at a gentle heat, by which it loses 23.09 per cent. of its weight; soluble in 200 parts of cold and 100 parts of boiling water; soluble in the concentrated acids and in the alkalis; and precipitated by the infusion of galls. Used medicinally, it is a stimulant tonic; and in large doses it

evacuates the contents of the stomach and bowels, and is often employed for this purpose in South America. In northern latitudes it is not so efficacious in intermittents as Peruvian bark; but is said to be particularly beneficial in bilious diarrhœas and dysentery, and has been recommended in dyspepsia and other diseases where tonic treatment is required. There is a False Angustura bark, which possesses poisonous properties, and which has in some instances produced unpleasant effects when prescribed by mistake for that medicine. It was formerly supposed to be produced by *Brucea anti-dysenterica*, and hence its active principle was called *Brucia*; but it has now been ascertained to be the bark of *Strychnos nux vomica*.

The genus *Ticorea* seems also to possess medicinal properties. The bark of *T. febrifuga* is very bitter and astringent. The leaves of *T. foetida*, when bruised, emit a disagreeable smell, resembling Stramonium; and in Brazil the inhabitants believe that the juice of the leaves of *T. jasminiflorum* will cure frambœsia. The root of *Monnieria trifolia* is acrid and aromatic, possessing diaphoretic and diuretic properties; among the inhabitants of South America it is highly esteemed as a remedy against the bites of serpents and enchantments.

Pilocarpææ.—The bark of *Esenbeckia febrifuga* is considered by the Brazilians equal in its effects to Peruvian bark. It is a tree growing forty feet high, and is a native of the province of Minas Geraes, where it is called *Tres Folhas vermelhas* and *Lorangeiro do Mato*. The bark of *Hortia brasiliensis* is also bitter and astringent, and used for the same purposes as the others. In Brazil it is commonly called *Quina*.

The *Beroniææ* are not known to possess any properties; but the leaves of some species of *Correa* are said to be used by the country people in Australia instead of tea.

Eudiosmeæ.—In this tribe the species are remarkable for their essential oil and peculiar aromatic resin. They are reputed to be stimulant and antispasmodic. The drug called *Buchu* is the leaves of *Barosma pulchella*, *crenata*, and *serratifolia*. These leaves have a strong and somewhat aromatic odour, and their taste is bitterish, analogous to that of mint, by which they are distinguished from senna. *Buchu* is gently stimulant, and is given in complaints of the urinary organs, such as gravel, chronic catarrh, and morbid irritation of the bladder and urethra, disease of the prostate gland, and retention or incontinence of urine from a loss of tone in the parts. It has also been recommended in chronic rheumatism, dyspepsia, cutaneous affections, and dropsy. The Hottentots use the leaves dried and powdered, mixed with grease, to anoint themselves; and this gives them such a rank and disagreeable odour that Thunberg could not bear the smell of the men that drove his waggon.

Of the *Dictamnææ*—The *Bastard Dittany*, or *Burning Bush*, as it is sometimes called (*Dictamnus Frazinella*),—emits, when gently rubbed, an odour like that of lemon-peel, but when bruised it has somewhat of a balsamic scent. This fine scent is strongest in the flower-stalks, which are covered with glands of a rusty red colour, exuding a viscid juice or resin, which contains so great a quantity of essential oil, that in hot weather it exhales in vapour, and in a dark place the surrounding atmosphere may be seen to become inflammable. The root is bitter and aromatic, and has been used as an anthelmintic, emmenagogue, and stomachic tonic.

Xanthoxyleæ.—This tribe also yields an essential oil and a bitter resinous substance, and possesses stimulant and tonic properties, promoting the action of the digestive organs and the secretions. Some of them are used as condiments; and have a hot, acrid, and aromatic taste. *Xanthoxylum fraxineum*, a native of the United States, is called *Toothache Tree*, or *Prickly Ash*. The leaves and seed-vessels have an aromatic odour, similar to that of oil of lemons; and the seed-vessels and bark have a hot, acrid taste. The bark is used medicinally as a stimulant, producing, when swallowed, a sense of heat in the stomach; and is thought to resemble mezereon and guaiac in its remedial action. It is greatly extolled in the United States as a remedy in chronic rheumatism, in doses of ten grains to half a drachm of the powder, repeated three times a day. The powder of the bark is used as a popular remedy in toothache, and hence the origin of the name. The constituents of the bark are, a volatile oil, a greenish fixed oil, resin, gum, colouring matter, and a peculiar crystallizable principle called *Xanthoxylum*. The root of *X. nitidum* is acrid and aromatic, and is employed by the Chinese as a calefacient, sudorific, emmenagogue, and febrifuge; and the leaves are used as a condiment. To the same uses the seed-vessels and seeds of *X. budrunga* are applied, and the latter have the fragrance of lemon-peel. *X. rhetsa* is a native of the mountains of India; its inner bark is bitter and acrid; its immature fruit tastes like orange-peel, and the seeds like black pepper. The tree is called by the Telingas "*Rhetsa-mann*." *Rhetsa* signifies a committee or select number of men assembled to settle disputes, and *mann* means trees of the largest size. Under the shade of this tree, which is fifty feet high, the hill people assemble to examine, agitate, and determine their matters of public concern, deliver discourses, and for similar purposes; and there are many other species which exhibit the same properties. The wood of *X. emarginatum* is white, close-grained, and has an aromatic scent. The seeds and seed-vessels of *X. hostile* are used in the mountainous parts of India to intoxicate fish. *Ptelea trifoliata*, a native of North America, is considered a vermifuge. The leaves, when bruised, have a strong smell; the seed-vessels are bitter and aromatic, and have been used successfully as a substitute for hops in brewing. The leaves of the Indian species are eaten raw for pains in the bowels, and the pungent ripe berries make an excellent pickle. The bark and root of *Toddalia aculeata* is said to be used as a cure for the remittent fevers caught in the jungles of the Indian hills. The bark of *Blackburnia monadelphæ* is yellowish-green on the outside, and deep red on the inside, tinging the saliva with that colour; and it is a strong astringent. *Vepris undulata*, a native of the Cape of Good Hope, is called *White Iron-wood*. Its wood is very hard and tough, and is used chiefly for ploughs, axles, and other agricultural implements.



ORDER LXI.—OCHNACEÆ—THE OCHNA FAMILY.

WOODY plants, which are very smooth in all their parts. *Leaves* alternate, simple, furnished with two leaflets at their base, which early fall off. *Flowers* hermaphrodite, regular, arranged in racemes, rarely solitary. *Corolla* with four petals, rarely ten, alternating with the segments of the calyx, and inserted in the receptacle. *Calyx* with five segments, which are hardly connected at the base, embriate in æstivation. *Stamens* five, alternating with the petals, and inserted with them; sometimes ten, or indefinite in number; *anthers* two-celled, inserted by the base. *Ovaries* equal in number to the petals; *style* one, thread-like, permanent, widened at the base, bearing the ovaries on the somewhat globose fleshy disk. *Fruit* composed of carpels, which are either drupaceous or berry-like, one seeded, unopening, inserted in a whorl round the base of the style. *Seeds* without albumen. *Embryo* straight, with a short radicle, and two thick seed-leaves.



Fig. 84. *Ochna atropurpurea*.

GENERA AND SYNONYMES.

<i>Elvasia</i> , DC.	<i>Philomeda</i> , Nor.	<i>Diporidium</i> , Wendl.
<i>Gomphia</i> , Schreb.	<i>Cittorrhynchus</i> , W.	<i>Godoya</i> , R. & P.
<i>Jabotapita</i> , Pl.	<i>Walkera</i> , Schreb.	<i>Blasthemanthus</i> , Pl.
<i>Ouratea</i> , Aubl.	<i>Meesia</i> , Gärtn.	<i>Cespedesia</i> , Goud.
<i>Correia</i> , Velloz.	<i>Ochna</i> , Schreb.	

GEOGRAPHICAL DISTRIBUTION.—With the exception of a few that are found at the Cape of Good Hope, the whole of this family is found between the tropics of India, Africa, and America.

PROPERTIES AND USES.—The seed vessels of *Gomphia jabotapita* are astringent, and not only eaten raw by the natives of the Caribbee islands, but an oil is expressed from them, which is used in salads. The corky bark of *G. hexasperma* is employed by the inhabitants of Brazil to cure wounds in cattle occasioned by the bites of insects. The roots and leaves of *Walerka*

serrata are bitter, and a decoction of them, either in water or milk, is used in Malabar as a tonic, stomachic, and anti-emetic.

CORIARIEÆ.

The genus *Coriaria*, which includes some seven or eight species, has been by various botanists referred to different orders, and some have raised it into a family of itself; but there is a great diversity of opinion still existing with regard to the position it ought to occupy in the natural system. Some botanists refer it to *Terebinthaceæ* of Jussien, others to *Celastraceæ* and to the vicinity of *Malpighiaceæ*, while De Candolle has constituted it into a distinct family conterminous to *Oelnaceæ*. Till some decision has been come to on the subject, we shall rest content with the position assigned to it by De Candolle, but at the same time not give it the prominence of a distinct order.

Trees or shrubs with square branches. *Leaves* opposite, simple, three-nerved, entire, ovate or heart-shaped. *Flowers* either hermaphrodite or unisexual. *Calyx* bell-shaped, with ten lobes; the five outer are larger than the five inner ones, and they are alternate with each other. *Corolla* with five petals, inserted in the receptacle, shorter than and alternate with the lobes of the calyx. *Stamens* ten, inserted in the receptacle. *Ovary* sessile, five-lobed, five-celled. *Ovules* solitary in the cells and pendulous. *Stigmas* five, issuing from the centre of the ovary. *Fruit* composed of five nuts, arranged in a whorl round the axis, unopening, one-seeded. *Seeds* pendulous, without albumen. *Embryo* straight, with a superior radicle.

The species are natives of the south of Europe, South America, New Zealand, and Northern India.

The leaves of *Coriaria myrtifolia* have astringent properties, and have been used for dyeing black, as well as for tanning leather, whence it has been called *tanners' sumach*. The fruit are poisonous, and when eaten produce vertigo and epilepsy. When the French army was in Spain, some of the men ate of these berries, of whom three died. The leaves are equally dangerous, and cause vertigo in cattle which browse on them; but it is said that only the old leaves have this effect, the young being perfectly innocuous. Sometimes they are used for adulterating Senna, and fatal consequences have been the result. The fruit of *C. nepalensis* are said to be used in India, and that of *C. sarmentosa* in New Zealand, without inconvenience, but the seeds are regarded as poisonous.



ORDER LXII.—SIMARUBACEÆ—THE QUASSIAS.

TREES or shrubs compose this family. *Leaves* alternate, sometimes simple, but more frequently compound, without dots, and no leaflets at the base. *Flowers* hermaphrodite, rarely unisexual, regular. *Calyx*, Fig. A, with four or five segments hardly united at the base. *Corolla* with four or five petals longer than the calyx, and alternating with them, either spreading or forming a tube. *Stamens*, Fig. B, double the number of the petals, sometimes longer and at others shorter than they, inserted on the back of hypogynous scales. *Ovaries*, Fig. B, four or five, distinct, seated on the gynophore, which bears the stamens at the base; each ovary one-celled and one-ovuled. *Style* simple, terminated by a four or five-lobed stigma. *Fruit*, Fig. C, composed of four or five drupes, or fewer by abortion, one-celled, one-seeded, unopening, and arranged in a whorl on a common receptacle. *Seed* pendulous, with a membranous integument, without albumen. *Embryo* with a short superior radicle drawn back between the cotyledons.

Fig. 85. *Quassia amara*.

TRIBE 1. Simarubecæ.

GENERA AND SYNONYMS.

<i>Quassia</i> , L.	„ <i>Vitamannia</i> ,	<i>Manungala</i> ,	<i>Zwingeria</i> , Schreb.
<i>Samadera</i> , Gert.	[<i>Vahl</i> .	[<i>Blanco</i> .	<i>Hannoa</i> , Planch.
<i>Samaudura</i> , L.	<i>Niota</i> , Lam.	<i>Simaba</i> , St. Hil.	<i>Simaruba</i> , Aubl.
<i>Locandi</i> , Ad.	<i>Biporeia</i> , Thou.	<i>Aruba</i> , Aubl.	<i>Castela</i> , Turp.
	<i>Mauduyta</i> , Com.	<i>Phyllostema</i> Neck	

TRIBE 2. Harrisoniæ.

GENERA AND SYNONYMS.

<i>Harrisonia</i> , R. Br.	[„ <i>Ebelingia</i> , Rehb.	[<i>Lasiolepis</i> , Bennett.
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TRIBE 3. Ailanthææ.

GENERA AND SYNONYMS.

<i>Ailanthus</i> , Desf.	„ <i>Nima</i> , Hamilt.	<i>Æschryon</i> , Fl. Fl.	<i>Picrodendron</i> ,
<i>Tarrietia</i> , Bl.	<i>Pieræna</i> , Lindl.	<i>Brucea</i> , Miller.	[<i>Planch</i> .
<i>Picrasma</i> , Bl.	<i>Munteria</i> , Walp.	<i>Picramnia</i> , Siez.	

TRIBE 4. Spatheliæ.

GENERA AND SYNONYMS.

<i>Spathelia</i> , L.	[<i>Spathe</i> , P. Br.	[„ <i>Benjaminia</i> ,	<i>Eurycoma</i> , Jack.
	<i>Dictyoloma</i> , DC.	[<i>Fl. Fl.</i>	

GEOGRAPHICAL DISTRIBUTION.—The whole of this family are natives of the tropics of America, India, and Africa, with the exception of one, which is found in Nepaul.

PROPERTIES AND USES.—These abound in a peculiar extractive substance which in itself is narcotic; they are all possessed of bitter and tonic properties, and are highly esteemed as invigorating the digestive organs.

From *Quassia amara*, Fig. 85, the drug *Quassia* was originally obtained. It is a small branching tree or shrub from fifteen to twenty feet high, a native of the woods of Surinam, Guiana, Cayenne, and the Island of Trinidad. Every part of the plant possesses the bitter principle, even to the leaves and flowers, but it is the wood only which is used; and it is very rarely that now any part of this ever comes to this country, it being so very scarce and of small bulk its place is supplied by other individuals of the family, although none of them yield the same intense bitter which this does. That which is most abundant, and which is in fact in general use, is the wood of *Simaruba excelsa*, called in the Caribbee islands *Bitter Ash*. It is a native of the woods of Jamaica and other of the West India islands, where it forms a lofty tree from sixty even to a hundred feet high. The medicinal virtues of *Quassia amara* were discovered about the middle of the last century, by a negro of Surinam, named Quassi, Coissi, or Quass, who acquired considerable reputation from employing the wood with great success as a secret cure in the malignant endemic fevers which are so prevalent in that country. He was induced to disclose his secret by Daniel Rolander, a Swede, who in 1756 brought specimens of the wood to Stockholm, and from that time the effects of this drug have been well known throughout Europe, and the name of the negro has been perpetuated in that of the plant. But the *Quassia* of Surinam is not now or very rarely in use, its place being, as we have already stated, supplied by *Simaruba excelsa*.

Quassia is purely tonic, invigorating the digestive organs with little excitement of the circulation or increase of animal heat. It has no sensible odour, and its taste is purely bitter, which is surpassed by that of few other substances in intensity and permanence. Its virtues depend on a peculiar bitter crystallizable principle discovered by Winekler, and called *Quassin*, which is white, opaque, unalterable in the air, inodorous, and of an intense bitterness, which in the solution is almost insupportable. The bitterness is pure, and resembles that of the wood. *Quassin* when heated melts like resin; and it is perfectly neuter, though both alkalies and acids increase its solubility in water. Its ultimate constituents are carbon, hydrogen, and oxygen. *Quassia* is used by brewers as a substitute for hops, but Dr. Thomson says that beer made with it does not keep, but soon becomes muddy and flat, has a mawkish taste, and soon runs into the acetous fermentation; and that the wood has narcotic properties is evidenced by the facility with which a decoction of it poisons flies.

The bark of the root of *Simaruba officinalis* forms the drug called *Simaruba Bark*. The tree which produces it grows in Guiana and Cayenne, Jamaica, and other West India islands. It attains the height of sixty feet, and is called *Bitter Damson*, *Mountain Damson*, and *Slave Wood*. It was introduced into France in 1713, from Guiana, where it had been previously used as a remedy for dysentery, and it soon established its reputation throughout Europe after the years 1718 and 1723, when an epidemic flux

prevailed throughout Europe, and resisted all the remedies employed except Simaruba. It possesses the same tonic properties as other simple bitters, and may be employed for the same purpose; and though it operates simply as a tonic it may be occasionally beneficial in relaxed and debilitated conditions of the alimentary canal, but it would do much harm if indiscriminately prescribed in dysenteric cases. The wood is hard and useful for buildings; it splits freely and makes excellent staves for sugar hogsheads, and it has no bitter taste.

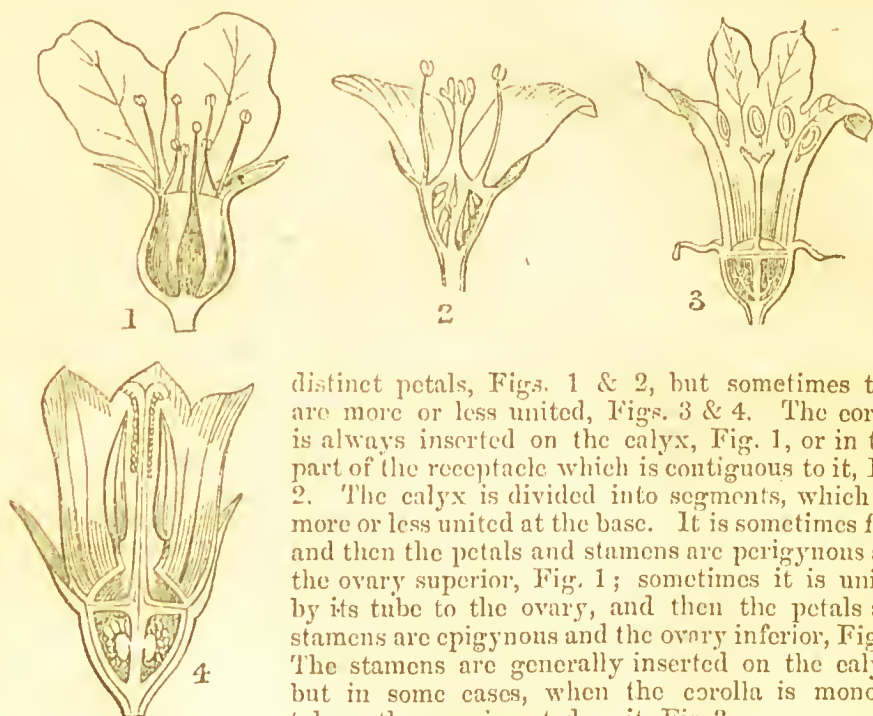
Simaruba versicolor, called *Paraiba* in Brazil, is regarded by the inhabitants of Rio San Francisco, as a powerful bitter, and, infused in brandy, is employed with great success in curing the bites of serpents. From its great bitterness it is particularly obnoxious to insects, and hence it is used against the pediculous diseases to which both men and horses are subject in Brazil. *Picrasma quassioides* and *Simaba guanensis* possess the same bitter properties as the rest of the family. *Simaba cedron*, a native of the isthmus of Darien, Carthage, and Costa Rica, is a small tree with an erect stem, not exceeding six inches in diameter. The whole of this plant appears to be impregnated with a bitter principle, but it is the seed only that is used, and is known under the name of *Cedron*. The seeds are inodorous, but of a pure and intensely bitter taste, not unlike that of quassia, which is supposed to be owing to an active principle in the form of a crystalline substance of intense bitterness called *cedrin*. As a medicine, Cedron has great reputation in New Granada and Central America, as a remedy for the bite of serpents, and in hydrophobia; and such is the confidence of the natives in its virtues that they have no fear of the poisonous bites of these reptiles if provided with the antidote. M. Herran states that he had employed the remedy in eight cases of poisoning, and that his mode of using it was to administer five or six grains with a spoonful of brandy, and to dress the bite with the tincture. It is also highly esteemed in the treatment of intermittent fever, spasm of the stomach and bowels, and dyspeptic affections; but it is poisonous in over doses, and has occasioned death in the quantity of twenty-five or thirty grains.

Brucea antidysenterica is a native of Abyssinia, where it is called by the natives *Woogi-noos*. The root is used as a specific in dysentery, and yields a plain simple bitter, without any aromatic or resinous taste, leaving in the throat and palate something of roughness resembling ipecacuanha. It was for a long time considered that the False Angustura Bark was derived from this tree, and hence, on the analysis of that article, the active principle which was discovered in it by Pelletier and Caventou, was named *Brucea*; but it is now known that the false bark is obtained from *Strychnos nuxvomica*, and hence the dangerous results which have followed its administration. See *Galipea cuspara*, page 218.



CLASS II.—CALYCIFLOREÆ.

FLOWERS provided with two floral envelopes (*dichlamydeous*), that is, having both a calyx and a corolla. The corolla is generally composed of



distinct petals, Figs. 1 & 2, but sometimes they are more or less united, Figs. 3 & 4. The corolla is always inserted on the calyx, Fig. 1, or in that part of the receptacle which is contiguous to it, Fig. 2. The calyx is divided into segments, which are more or less united at the base. It is sometimes free, and then the petals and stamens are perigynous and the ovary superior, Fig. 1; sometimes it is united by its tube to the ovary, and then the petals and stamens are epigynous and the ovary inferior, Fig. 2. The stamens are generally inserted on the calyx; but in some cases, when the corolla is monopetalous, they are inserted on it, Fig 3.

Group 1. POLYPETALÆ.—Petals distinct. Figs. 1 & 2.

‡ *A. Perigynæ*.—Petals and stamens perigynous; that is, inserted on the calyx, which is free, and the ovary superior. Fig. 1.

Order 63. STACKHOUSIACEÆ.

- 64. CELASTRACEÆ.
- 65. CHAILLETIACEÆ.
- 66. RHAMNACEÆ.
- 67. ANACARDIACEÆ.
- 68. AMYRIDACEÆ.

Ord. 69. CONNARACEÆ.

- 70. LEGUMINIFERÆ.
- 71. ROSACEÆ.
- 72. CALYCANTHACEÆ.
- 73. LYTHRACEÆ.
- 74. VOCHYSIACEÆ.
- 75. SAXIFRAGACEÆ.
- 76. CRASSULACEÆ.
- 77. ILLECEBRACEÆ.
- 78. PORTULACACEÆ.
- 79. MESEMBRYACEÆ.
- 80. TURNERACEÆ.
- 81. PAPAYACEÆ.
- 82. PASSIFLORACEÆ.

§ *B. Epigynæ*.—Petals and stamens epigynous; that is, inserted on the calyx, the tube of which is adherent to the ovary, and the ovary inferior. Fig. 2.

Order 83. CUCURBITACEÆ.

84. LOASACEÆ.

85. HOMALIACEÆ.

86. CACTACEÆ.

87. RIBESACEÆ.

88. ESCALLONIACEÆ.

89. PHILADELPHACEÆ.

90. MYRTACEÆ.

91. HALORAGIACEÆ.

92. CENOTHERACEÆ.

93. RHIZOPHORACEÆ.

94. MELASTOMACEÆ.

95. COMBRETACEÆ.

96. ALANGIACEÆ.

96* LORANTHACEÆ. (P. 847.)

97. CORNACEÆ.

98. HAMAMELIDACEÆ.

99. BRUNIACEÆ.

100. UMBELLIFERÆ.

101. ARALIACEÆ.

Group 2. MONOPETALÆ. — Petals united. Figs. 3 and 4.

§ *C. Epicorollæ*.—Stamens inserted in the corolla, and the corolla epigynous; that is, inserted on the calyx, the tube of which is adherent to the ovary, and the ovary inferior. Fig. 3.

Order 102. CAPRIFOLIACEÆ.

103. RUBIACEÆ.

104. VALERIANACEÆ.

105. DIPSACACEÆ.

106. CALYCERACEÆ.

107. COMPOSITÆ.

§ *D. Epigynæ*.—Stamens and corolla inserted on the ovary. Fig. 4, as in § *B*.

Order 108. GOODENIACEÆ.

109. STYLIDIACEÆ.

110. CAMPANULACEÆ.

111. LOBELIACEÆ.

112. SYMPLOCACEÆ.

113. COLUMELLIACEÆ.

114. VACCINIACEÆ.



ORDER LXIII.—STACKHOUSIACEÆ—THE STACKHOUSIA FAMILY.

HERBACEOUS and occasionally shrubby perennials, with a watery juice.

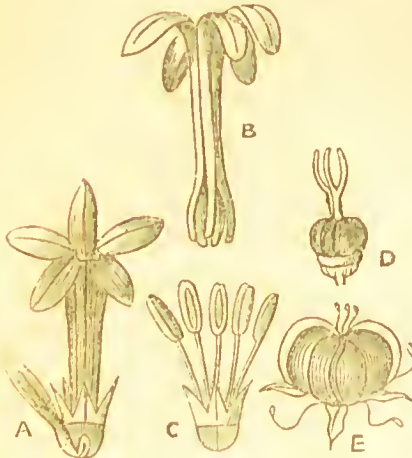


Fig. 86. *Stackhousia monogyna*.

Leaves alternate, simple, entire, or compound; sometimes small, with very minute double leaflets at the base. *Flowers* hermaphrodite, regular, Fig. A, arranged in terminal spikes, and each flower with three bracts. *Calyx* free, with a swollen tube, and with a five-lobed limb. *Corolla* with five petals alternate with the lobes of the calyx, formed into a tube at the apex, but free at the base, Fig. B. *Stamens* five, inserted with the petals, alternate with them, and rising from the throat of the calyx, Fig. C. *Filaments* free, the two alternate ones shorter than the others; *anthers* opening inwards, two-celled. *Ovary*, Fig. D, sessile, free, superior, three to five-lobed; *ovule* solitary, erect; *styles* three to five, usually united at their bases; *stigmas* simple. *Fruit*,

Fig. E, composed of three to five seed-nuts, unopening, with or without wings, and attached to the central axis. *Seed* erect, with a membranous integument. *Embryo* erect, in the axis of a fleshy *albumen*, with which it is almost equal in length, and with short obtuse seed-leaves and an inferior radicle.

GENERA.

Stackhousia, *Smith*.
Tripterococcus, *Endl*.

GEOGRAPHICAL DISTRIBUTION.—This family is composed of only about ten species, and they are all found in Australia. None of them are known to possess any properties, or to yield any useful products.

ORDER LXIV.—CELASTRACEÆ—SPINDLE TREES

SHRUBS or small trees, some of which are climbing. *Leaves* alternate, rarely opposite, simple, and furnished with small deciduous leaflets at their base. *Flowers* hermaphrodite or unisexual, regular. *Calyx* with four equal lobes set in the margin of an angular disk. *Corolla* with four or five petals alternating with the sepals, imbricate in æstivation. *Stamens* equal in number with the petals, and alternate with them, inserted in the disk. *Ovary* sessile, with two, three, or five cells, more or less deeply imbedded in the disk; *style* short, thick; *stigma* scarcely lobed. *Fruit*, Figs. A B, superior, either capsular, with two, three, or five one or two-seeded cells, or drupaceous, containing a two-celled nut. *Seeds* ascendant, rarely resupinate, suspended, with or without an aril. *Embryo*, Fig. C, straight, with thick flat seed-leaves, and a short inferior radicle enclosed in a fleshy *albumen*. *Fruit* either capsular or drupaceous.

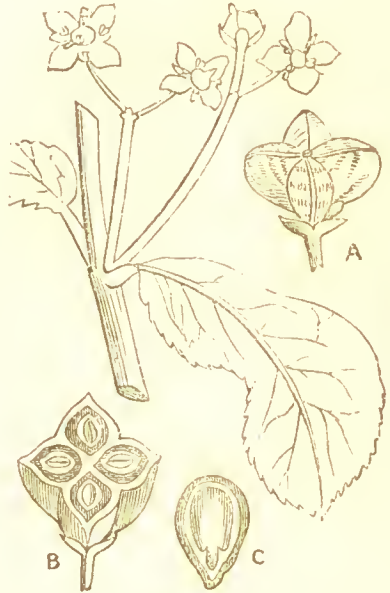


Fig. 87. *Euonymus europæus*.

TRIBE 1. *Staphyleæ*.—Seeds bony, truncate at the hilum, without an aril. Albumen either very small or wanting. Leaves compound, pinnate, or trifoliate.

GENERA AND SYNONYMES.

<i>Staphylea</i> , L.	<i>Turpinia</i> , Vent.
<i>Staphylodendron</i> , T.	<i>Dalrympelea</i> , Roxb.
<i>Bumalda</i> , Th.	<i>Euscaphis</i> , S. & Z.

TRIBE 2. *Euonymææ*.—Fruit capsular. Seeds not truncate at the hilum, and furnished with an aril. Embryo straight, placed in the axis of a fleshy albumen.

GENERA AND SYNONYMES.

<i>Putterlickia</i> , Endl.	<i>Catha</i> , Forsk.	<i>Maiten</i> , Feuill.
<i>Lophopetalum</i> , Wight.	<i>Sonneratia</i> , Com.	<i>Hankia</i> , R. & P.
<i>Euonymus</i> , T.	<i>Trigonotheca</i> , Hochst.	<i>Senecia</i> , Com.
<i>Polycardia</i> , Juss.	<i>Celastrus</i> , Kunth.	<i>Microtropis</i> , Wall.
<i>Florinda</i> , Nor.	<i>Mortonia</i> , A. Gray.	<i>Pterocelastrus</i> , Meisn.
<i>Commersonia</i> , Com.	<i>Maytenus</i> , Juss.	<i>Asterocarpus</i> , E. & Z.

TRIBE 3. *Elæodendrææ*.—Fruit drupaceous, indehiscant.

GENERA AND SYNONYMES.

<i>Ptelidium</i> , Thou.	<i>Wimmeria</i> , Schl.	<i>Pleurostylia</i> , W. & A.
<i>Seringia</i> , Sp.	<i>Frauenhoferia</i> , Mart.	<i>Hartogia</i> , Th.

Schrebera, <i>Th.</i>	„ Nerija, <i>Roxb.</i>	Caryospermum, <i>Bl.</i>
Curtisia, <i>Ait.</i>	Skytophyllum, <i>E. & Z.</i>	Myginda, <i>Jacq.</i>
Elæodendron, <i>Jacq.</i>	Lauridia, <i>E. & Z.</i>	Rhacoma, <i>L.</i>
Schrebera, <i>Retz.</i>	Mystroxylon, <i>E. & Z.</i>	Crossopetalum, <i>P.Br.</i>
Portenschlagia, <i>Tratt.</i>	Crocoxylon, <i>E. & Z.</i>	Pachystima, <i>Raf.</i>
Lamarkia, <i>Hort.</i>	Parilla, <i>Dennst.</i>	Oreophila, <i>Nutt.</i>

DOUBTFUL GENERA.

Bhesa, <i>Hamilt.</i>	Tralliana, <i>Lour.</i>	„ Gupia, <i>Jaume.</i>	Perrottetia, <i>Knth.</i>
Kurrimia, <i>Wall.</i>	Lepta, <i>Lour.</i>	Glossopetalum,	Alzatea, <i>R. & P.</i>
Actegiton, <i>Bl.</i>	Goupia, <i>Aubl.</i>	[<i>Schreb.</i>]	Alziniana, <i>Dietr.</i>

GEOGRAPHICAL DISTRIBUTION.—These are generally found in the warm parts of the southern hemisphere, and become rare towards the pole and the tropics. The greatest number is found at the Cape of Good Hope, and they are more numerous between the tropics of Asia than in the warmest parts of America. Some are found in the south of Europe, some in Chili and Peru, and a few in Australia.

PROPERTIES AND USES.—The virtues of this family are generally bitter, astringent, and acrid, purgative and emetic, or moderately stimulant. None of the fruit is eatable, and the seeds of some yield oil.

The *Common Bladder Nut* (*Staphylea pinnata*) is a native of England, and is known by its bladder-like seed-vessels. Haller says that children eat the seeds. The seeds are oily, and being hard, are strung by Roman Catholics for beads in some countries. The inner bark of the root of *Euscaphis staphyleoides* is bitter and astringent, and is used by the Japanese in dysentery and chronic diarrhoea.

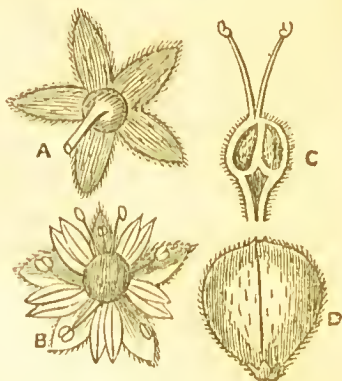
The *Common Spindle Tree* (*Euonymus europæus*), Fig. 87, is so called from its wood being used long ago for making spindles. It is called *Prick-wood* and *Prick-timber*, from being used for toothpicks and skewers. The wood is said to be used by musical instrument makers. For skewers and toothpicks the wood should be cut when the shrub is in bloom, for then it is tough, and not easily broken; it is also used by watchmakers for cleaning watches. The berries act as an emetic and purgative, and are fatal to sheep; and when powdered and sprinkled on the hair, destroy pediculi; sometimes it is made into an ointment for the same purpose. No animals, except the goat, will browse upon the plant. The yellow bark of *E. tingens* is employed by the Nepaulèse for the purpose of marking the forehead with the idolatrous symbol commonly called “Tika,” and is also used as a dye. *E. americanus* is called *Burning Bush* in the United States, on account of the great abundance of its scarlet fruit. *E. atropurpureus*, a native of the United States, is called *Wahoo* by the North-Western Indians. It is considered beneficial in diseases of the lungs, and is a popular remedy for such affections among the Americans. The bark is said to be tonic, hydragogue, cathartic, diuretic, and antiperiodic. It has been found useful as a diuretic in dropsy, administered in the form of a decoction or infusion, made in the proportion of an ounce of the bark to a pint of water, in the dose of a wine-glassful several times a day. The wood of some species of *Catha* is very hard and durable, and makes excellent timber. The leaves of *C. edulis*, called *Khât* by the Arabs, are by them eaten green, and are supposed to have the power of inducing extreme watchfulness, so that a man may stand sentry all night without drowsiness. They also consider it an antidote to

the plague, and that infection cannot be contracted if a twig is carried about the person. The Arabs cultivate it in their gardens along with their coffee. The oil expressed from the seeds of *Celastrus nutans*, or *paniculatus*, is said in India to be of a stimulant nature, and to be used in medicine in the disease called Beriberri. Thunberg states that the branches of *C. alatus* are used by the Japanese lovers to fasten to the outside of the door of the house in which the object of their desires resides. The bark of *C. scandens*, a native of the United States, and there called *Climbing Staff Tree*, has been used in chronic affections of the liver, secondary syphilis, and dropsical affections. It is said to possess emetic, diaphoretic, and narcotic properties. The bark of the root is said to be good in inflammatory rheumatism, and to purify the blood. The root of *C. senegalensis* is a bitter astringent, and slightly purgative. *C. acuminatus*, a native of the Cape of Good Hope, is a shrub from ten to fifteen feet high, and is highly esteemed for its wood, which is fine-grained, hard, and heavy, and when polished, exhibits beautiful shades. It is generally employed by the settlers for carriage poles, but is well adapted for fancy work and turnery. A decoction of the twigs of *Maytenus boaria* is used by the Chilians to bathe the swellings produced by the poisonous Shade of the Llithi (*Rhus caustica*), and the leaves are used as a substitute for senna. *Pterocelastrus rostratus* is a small tree, from fifteen to twenty feet high, and produces a heavy and strong wood, resembling that of the apple or pear, and is much used by the Cape settlers for waggon work, and particularly for fellics.

Hartogia capensis, called by the Dutch settlers at the Cape *Ladlewood*, is a shrub from ten to fifteen feet high, and from a foot to a foot and a half in diameter in the trunk. Its wood is hard, fine-grained, close, and tough. When polished it surpasses the finest mahogany in colour, as well as in texture, it is adapted for all kinds of superior furniture, and is valuable to the cabinet-maker for veneering. In the colony it is used for waggons and agricultural implements. *Curtisia faginea*, also a native of the Cape, is called *Assagay-tree*, and is used by the Hottentots and Caffres for making their javelins or assagays, which they throw with great dexterity to the distance of a hundred paces, using them to defend themselves and to kill buffaloes and other wild animals. This wood is extremely tough, heavy, close-grained, very durable, and resembles ordinary mahogany. It is much used in the colony for all kinds of superior furniture, tools, and in the construction of waggons, particularly in South Africa, where the natural difficulties of the roads, the great distances, and the excessive heat of the climate, require strong and substantial built vehicles for travelling. *Elæodendron glaucum*, a native of Ceylon and Coromandel, has been introduced under the name of *Ceylon Tea Tree*. Its leaves are like those of the tea-tree, but much longer, and their taste slightly bitter and astringent. *E. croceum*, called *Saffron-wood* at the Cape of Good Hope, produces a fine-grained, hard, close, and tough timber, very useful to the builder; and to the cabinet-maker it serves for tables, chairs, wardrobes, and all kinds of furniture. Butter casks are likewise made of it, and the wheelwrights of the colony use it for fellics and general waggon work. The fruit of *E. kuhu* are eaten by the colonists.

ORDER LXV.—CHAILLETIACEÆ—THE CHAILLETIA FAMILY.

SMALL trees or shrubs. *Leaves* alternate, stalked, feather-nerved, entire, with double leaflets at the base of the footstalks. *Flowers* hermaphrodite, or unisexual by abortion, regular and arranged in fascicles or corymbs, the footstalk of which is either free or adherent to the footstalk of the leaves. *Calyx*, Fig. A, five-lobed, hairy externally, and coloured on the inside, imbricate in æstivation. *Corolla*, Fig. B, with five petals, inserted in the base of the calyx, alternate with, and nearly of equal length with, its lobes; entire, notched, or two-cleft; sometimes free and of equal length, sometimes connected at the base with the stamens, and unequal; glands opposite, and free from the petals. *Stamens* five, inserted with the petals, alternate with them, and either of equal length or longer than they; *anthers* opening inwards, two-celled. *Ovary* free, sessile, from two to three celled, Fig. C; *ovules* two in each cell, collateral, pendulous. *Styles* two or three, thread-like, distinct, or more or less united; *stigma* simple, capitate, or two-lobed. *Fruit*, Fig. D, either capsular, two-celled, opening in two valves, and the cells one-seeded by abortion, or drupaceous, leathery, and dry, two or one-celled by abortion, cells one-seeded. *Seeds* solitary in each cell, naked or arillate, hanging from the apex, and without albumen. *Embryo* thick and straight, with plano-convex and fleshy seed-leaves, and a very short superior radicle.

Fig. 88. *Chailletia pedunculata*.

GENERA AND SYNONYMES.

Moacurra, Roxb.
Wahlenbergia, R. Br.
Chailletia, DC.
Symphyllanthus, Vahl.

„ *Mestotes*, Sol.
Patrisia, Rohr.
Dichapetalum, Thou.
Leucosia, Thou.

Plappertia, Reich.
Tapura, Aubl.
Rohria, Schreb.
Stephanopodium, Pöpp.

GEOGRAPHICAL DISTRIBUTION.—The few species hitherto discovered have been found in Sierra Leone, Madagascar, Cayenne, and Timor.

PROPERTIES AND USES.—*Chailletia toxicaria*, a native of the mountains of Sierra Leone, yields a fruit, the kernel of which is used for poisoning rats, and the shrub is hence called *Ratsbane* by the colonists.

ORDER LXVI.—RHAMNACEÆ—BUCKTHORNS.

TREES or shrubs, sometimes furnished with spines on their branches.

Leaves simple, alternate, sometimes opposite, with leaflets or spines at the base of the footstalk. *Flowers* small, hermaphrodite, rarely unisexual by abortion. *Calyx* with four or five lobes, which are valvate in æstivation; the tube adhering to the base of the ovary. *Corolla* with four or five clawed petals, which are often in the form of a scale, concave or convolute, inserted alternately with the lobes of the calyx on the margin of a fleshy disk which lines the inside of the calyx; sometimes the petals are wanting. *Stamens* equal in number, and opposite to the petals; *anthers* one to two celled. *Ovary* either free and frequently immersed in the disk, or more or less united to the tube of the calyx; two to three, rarely four-celled, and each cell containing one erect ovule; *style* simple; or equal in number to the



Fig. 89. *Ceanothus verrucosus*.

cells of the ovary. *Fruit* free, or more or less united to the calyx; drupaceous, as in *Rhamnus*, or capsular, with three monospermous shells, furnished with a membranous wing, as in *Paliurus*, or opening by an internal chink, as in *Ceanothus*. *Seeds* erect, furnished with a fleshy albumen, which is rarely wanting. *Embryo* straight, slender, about equal in length to the seed, with large flat seed-leaves, and a short inferior radicle.

TRIBE 1. *Paliureæ*.—Fruit half-inferior, dry, winged. Seed bony. Leaves alternate; oblique at the base.

GENERA AND SYNONYMS.

Ventilago, *Gærtn.* | *Paliurus*, *T.* | „ *Aspidocarpus*, *Neck.*

TRIBE 2. *Franguleæ*.—Fruit superior or half-inferior, set in the hollow of the calyx, drupaceous or capsular. Trees or shrubs, with alternate, rarely opposite, leaves.

GENERA AND SYNONYMS.

<i>Microhamnus</i> , <i>A.</i> [<i>Gray.</i>	<i>Hovenia</i> , <i>Thunb.</i> <i>Rhamnus</i> , <i>Juss.</i>	<i>Sarcophagus</i> , <i>P.</i> [<i>Br.</i>	<i>Ceanothus</i> , <i>L.</i> <i>Forrestia</i> , <i>Raf.</i>
<i>Zizyphus</i> , <i>T.</i>	<i>Alaternus</i> , <i>T.</i>	<i>Noltea</i> , <i>Reich.</i>	<i>Cormonema</i> , <i>Reiss.</i>
<i>Condalia</i> , <i>Cav.</i>	<i>Marcocella</i> , <i>Neck.</i>	<i>Vittmannia</i> , <i>W.</i>	<i>Arrabidaea</i> , <i>Steud.</i>
<i>Berberia</i> , <i>Neck.</i>	<i>Cardioplepis</i> , <i>Raf.</i>	[& <i>A.</i>	<i>Colubrina</i> , <i>L. C. R.</i>
<i>Gnoplea</i> , <i>Hedw.</i>	<i>Karwinskia</i> , <i>Zucc.</i>	<i>Willemetia</i> , <i>Bng.</i>	<i>Tubanthera</i> , <i>Ch.</i>
<i>Gnoplea</i> , <i>Schult.</i>	<i>Scutia</i> , <i>Comm.</i>	<i>Sarcophagoides</i> , [<i>DC.</i>	<i>Alphitonia</i> , <i>Reiss.</i>
<i>Sageretia</i> , <i>Brong.</i>	<i>Sentis</i> , <i>Comm.</i>		

TRIBE 3. *Colleticæ*.—Fruit superior, set in the hollow of the calyx, dry and wingless. Shrubs with spiny branches and decussate leaves.

GENERA AND SYNONYMS.

<i>Colletia</i> , <i>Comm.</i>	<i>Adolphia</i> , <i>Meisn.</i>	<i>Retanilla</i> , <i>Brong.</i>	<i>Talgueña</i> , <i>Miers.</i>
<i>Discaria</i> , <i>Hook.</i>	<i>Ochetophila</i> , <i>Pöpp.</i>	<i>Molinaea</i> , <i>Comm.</i>	<i>Trevoa</i> , <i>Gill.</i>

TRIBE 4. *Phyllicæ*.—Fruit inferior, capsular, wingless, surmounted by the permanent calyx. Heath-like, spineless shrubs, with alternate leaves.

GENERA AND SYNONYMS.

<i>Walpersia</i> , <i>Reiss.</i>	<i>Phyllia</i> , <i>L.</i>	<i>Spyridium</i> , <i>Fenzl.</i>
<i>Tricocephalus</i> , <i>Reiss.</i>	<i>Tylanthus</i> , <i>Reiss.</i>	<i>Cryptandra</i> , <i>Smith.</i>
<i>Petalopogon</i> , <i>Reiss.</i>	<i>Soulangia</i> , <i>Brong.</i>	

TRIBE 5. *Pomaderræ*.—Fruit capsular, wingless; cocculæ with a broad perforation at the base on the inside, and covered with a thin membrane. Spineless shrubs, with alternate leaves.

GENERA AND SYNONYMS.

<i>Pomaderris</i> , <i>Labill.</i>	<i>Pomatiderris</i> , <i>Kunth.</i>	<i>Nägelia</i> , <i>Zolling.</i>
<i>Pomatoderris</i> , <i>Schult.</i>	<i>Trymelium</i> , <i>Fenzl.</i>	

TRIBE 6. *Gouanieæ*.—Fruit inferior, capsular, with a deciduous areolate calyx, pear-shaped or three-sided, winged or wingless; cocculæ opening by an internal chink. Spineless, clasping shrubs or herbs.

GENERA AND SYNONYMES.

Helinus, <i>E. Mey.</i>	Retinaria, <i>Gart.</i>	Crumenaria, <i>Mart.</i>
Gouania, <i>Jacq.</i>	Reissekia, <i>Endl.</i>	

DOUBTFUL GENERA.

Solenanthes, <i>G. Don.</i>	Samara, <i>L.</i>	Galdieia, <i>Neraud.</i>	Carolinia, <i>Neraud.</i>
Schæfferia, <i>Jacq.</i>	Daphniphyllum, <i>Bl.</i>	Quoia, <i>Neraud.</i>	

GEOGRAPHICAL DISTRIBUTION.—These are distributed throughout the hot and temperate regions of the whole world, but they are not found in the Arctic zone.

PROPERTIES AND USES.—The prevailing principle in the Buckthorns is a bitter extractive substance, which is acrid or astringent. Some yield a colouring matter, others are tonic and antifebrile, while others promote secretions of the skin and kidneys, or act as purgatives and emetics.

Paliurus aculeatus, which is a shrub growing plentifully along both shores of the Mediterranean and in Syria, is called *Christ's Thorn*, from being supposed to be the thorn with which the Jews crowned our Saviour at His crucifixion. It is one of the most common shrubs of India, and its shoots are very pliant. The seeds are sold in the herb-shops of Constantinople, and used medicinally. They are also used as a dye. *Ventilago madraspatana* is a native of the mountains of Bengal, and is remarkable for the very offensive smell of its flowers, which is not unlike that of *Herculia foetida*; and its young stem and branches are striped with green and white bark.

The fruit of *Zizyphus vulgaris* is well known in the south of Europe under the name of *Jujube*, and is entirely destitute of the disagreeable properties of the generality of the family. The tree is about twenty feet high, and is extensively cultivated in Spain, the south of France, and in Italy, for the sake of its fruit, which in size and shape resembles a medium-sized plum. They are green at first, but as they ripen, become red on the outside and yellow within, tender and fleshy, with a sweet vinous acidulous taste, and containing an oblong pointed stone in the centre. They are gathered in September, when they are ripe, and preserved in a dry place for some time, and their pulp becomes softer and sweeter. After being dried they will keep for a long time, and may be used at pleasure. They are served up at table as a winter dessert, and are much esteemed. They are nutritive and demulcent, and are used in the form of decoction in pectoral complaints. Jujube paste, which is sold by confectioners and druggists, should consist of gum arabic and sugar dissolved in a decoction of this fruit and evaporated to the proper consistence, but as made in this country the fruit forms no part of the ingredient. *Z. lotus* is the *Lotos* of the ancient Lotophagi, celebrated by Homer, and who were so named from their living on the fruit of this shrub. It grows in Spain, Sicily, and over a considerable portion of Northern Africa, particularly in Barbary and Tunis, and is a shrub from two to three feet high, producing an abundance of fruit about the size of sloes, of a purplish colour, and with a farinaceous pulp, in the centre of which is a stone. Their flavour approaches nearly to that of figs or dates. They are eaten by the Arabs, by whom they are called *Seedra*. In the interior of Africa the natives convert the fruit into bread by exposing them some days to the sun, and afterwards pounding them gently in a wooden mortar until

the farinaceous part is separated from the stone. This meal is then mixed with a little water and formed into cakes, which when dried in the sun resemble in colour and flavour the sweetest gingerbread. This *Lotus* must not be confounded with the *Nymphaea lotus*—see *Nymphaeaceæ*—nor with the *Diospyros lotus*—see *Ebenaceæ*. *Z. spina christi* is supposed by Hasselquist to be that with which our Saviour was crowned, but the general belief is, as has already been stated, that the shrub so used was *Paliurus aculeatus*. The fruit of *Z. napeca* is eaten by the natives of Ceylon and other parts of the East Indies where it grows. They are of the size of a pea; smooth, black and shining, with a very acid and astringent taste. Rumphius says that three berries are a strong purgative. A decoction of the bark of the roots is said to promote the healing of fresh wounds. *Z. xylopyrus*, a native of the coast of Coromandel, produces fruit of the size of a large cherry, greenish and downy, the kernel of which tastes like a filbert, and is eaten by the natives. The tree is twenty feet high, and yields timber, which is much esteemed for its fine yellowish or orange colour, great hardness and durability, while, at the same time, it is not very heavy. Cattle eat the leaves, young shoots, and fruit. The *Jujube Tree* of India is *Z. jujuba*, a native of India, and cultivated in China and Cochin China. It is a small tree, sixteen feet high, and there is a variety of it which produces a sweet and mealy fruit, about the size of a hen's egg, and called, in Bengal, *Narikellekool*. The bark of the tree is said to be used in the Moluccas in diarrhœa and to strengthen the stomach. The fruit of *Z. orthacantha* is eaten by the natives of Senegal, and also converted into a sort of drink. The kernel of the nut of *Z. soporifera*, after being steeped a few days, causes gentle sleep and mitigates pain.

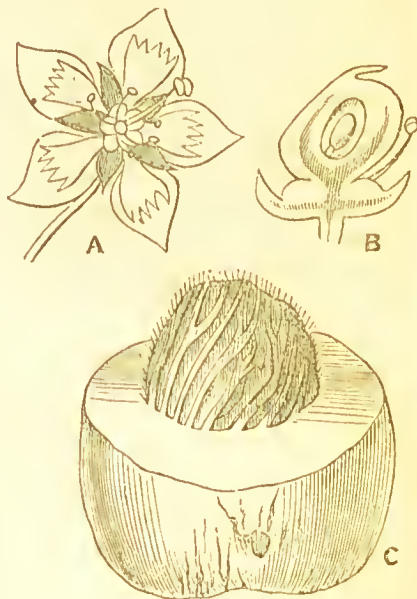
In China, *Segeretia thesans* is called *Tia*. The leaves are astringent and fragrant, and are used by the poor people as a substitute for those of the true tea. The fresh shoots and leaves of *Rhamnus alaternus* dye wool yellow, and Clusius states that the fishermen of Portugal dyed their nets red with a decoction of the bark. The leaves are astringent. The juice of the unripe berries of *R. catharticus*, a native of Britain, dyes of a saffron colour; but when the berries are ripe, the juice, mixed with lime or an alkali, and evaporated to dryness, forms the *Sap-green* of painters. The inner bark is said to be a powerful cathartic, and to excite vomiting. The berries are actively purgative, and are apt to cause nausea and severe griping, with much thirst and dryness of the mouth and throat. The dried berries of *R. infectorius* yield a rich yellow colour, and are imported into this country under the name of *Graines d'Avignon*, or *French berries*. This name is also given to the fruit of *R. amygdalinus*, *oleoides*, and *saxatilis*. The berries of *R. frangula*, a native of Great Britain, when unripe, dye wool green and yellow; but when ripe, blue and green. The bark dyes yellow, and, with preparations of iron, black. From a quarter to half an ounce of the inner bark, boiled in water or beer, is violently purgative. The wood makes excellent charcoal for gunpowder. When the ripe berries are bruised in cold water, and allowed to undergo the vinous fermentation for eight days, the liquor is to be boiled for half an hour. Wool, previously prepared with bismuth, may be dyed a beautiful green colour, which cannot be affected either by strong vinegar or a solution of potash: a little sugar-of-lead added to the dye considerably increases the colour.

Scutia sarcomphalus, a native of Jamaica, forms a large tree thirty feet high, with a trunk three feet in diameter. The wood is hard, of a dark colour and close grain, and is considered one of the best timber woods in Jamaica. The flower stalks of *Hovenia dulcis* have the singular property of thickening after flowering, and becoming extremely succulent with a sweet red pulp, which is eaten by the Japanese and Chinese, and has a taste resembling that of a ripe pear. The leaves of *Ceanothus americanus* were used during the revolutionary war as a substitute for tea, and hence it is called *New Jersey Tea*. A strong infusion of them is recommended as a local application in aphthous affections of the mouth and fauces, and the sore throat of scarlatina, and as an internal remedy in dysentery. The root is astringent and imparts a red colour to water, and is called *Red Root*. A decoction of it, in the proportion of two drachms to a pint of water, is said to be useful in syphilitic complaints. The root of *Discaria febrifuga* is acrid, and is employed in Brazil as a tonic and febrifuge.



ORDER LXVII.—ANACARDIACEÆ—THE CASHEW FAMILY.

TREES or shrubs, with a viscid, milky, or gummy juice. *Leaves* alternate, simple, ternate, or unequally pinnate, with entire or serrated leaflets, without pellucid dots, and no leaflets at the base of the stalks. *Flowers*, Fig. A, often unisexual from abortion, rarely hermaphrodite, regular. *Calyx* free, or rarely united by its tube to the ovary, and with three to five lobes. *Corolla* with from three to five petals, alternate with the lobes of the calyx, and inserted either in the calyx or in the calycine disk; imbricate, or rarely valvate in aestivation. *Stamens* equal in number to the petals and alternate with them, or double their number, but rarely more; they are either distinct or united at the base, and inserted on the calycine disk. *Ovary*, Fig. B, generally single, one-celled, free, or adherent with the tube of the calyx; sometimes four or five, distinct, or more or less united. *Style* simple, sometimes wanting. *Stigma* entire, or with three to five lobes. *Fruit*, Fig. C, a drupe containing from one to three one-seeded stones, rarely capsular and dehiscent. *Seed* without albumen. *Embryo* with thick and fleshy seed-leaves, and a more or less curved either superior or lateral radicle.

Fig. 90. *Mangifera indica*.

GENERA AND SYNONYMES.

<i>Pistacia</i> , L.	<i>Molle</i> , Chuss.	<i>Ozoroa</i> , Del.	<i>Acajou</i> , T.
<i>Tercbinthus</i> , Juss.	<i>Mulli</i> , Feuill.	<i>Heeria</i> , Meisn.	<i>Acajuba</i> , Gart.
<i>Lentiscus</i> , T.	<i>Duvaua</i> , Kunth.	<i>Römeria</i> , Th.	<i>Rhinocarpus</i> Bert.
<i>Dupuisia</i> , A. Rich.	<i>Mauria</i> , Kunth.	<i>Loxostylis</i> , Sp.	<i>Monodynamus</i> ,
<i>Sorindeia</i> , Thou.	<i>Lithrea</i> , Miers.	<i>Anasyllis</i> , E. Mey.	[Pohl.
<i>Comoladia</i> , P. Br.	<i>Llithi</i> , Feuill.	<i>Astronium</i> , Jacq.	<i>Semecarpus</i> , L.
<i>Dodonæa</i> , Pl.	<i>Malosma</i> , Nutt.	<i>Melanorrhæa</i> , Wall.	<i>Anacardium</i> Lam.
<i>Cyrtocarpa</i> , Kunth.	<i>Melanococœa</i> , Bl.	<i>Gluta</i> , L.	<i>Bouea</i> , Meisn.
<i>Odina</i> , Roxb.	<i>Rhus</i> , L.	<i>Stagmaria</i> , Jack.	<i>Cambessedea</i> , Wt.
<i>Wodur</i> , Anders.	<i>Pocophorum</i> ,	<i>Syndesmis</i> , Wall.	<i>Buchanania</i> , Roxb.
<i>Haberlia</i> , Denn.	[Nech	<i>Holigarna</i> , Roxb.	<i>Launzea</i> , Benth.
<i>Lannea</i> , A. Rich.	<i>Turpinia</i> , Raf.	<i>Hadestaphyllum</i> ,	<i>Cambessedea</i> , Kunth
<i>Anisostemon</i> , Trez.	<i>Schmalzia</i> , Desv.	[Dennst.	<i>Coniogeton</i> , Bl.
<i>Sclerocarya</i> , Hchst.	<i>Styphonia</i> , Nutt.	<i>Glycyrcarpus</i> , Dalz.	<i>Phlebochiton</i> , Wall.
<i>Nothopegia</i> , Bl.	<i>Botryceras</i> , W.	<i>Corynocarpus</i> , Forst.	<i>Spondias</i> , L.
<i>Pegia</i> , Colebr.	<i>Laurophyllus</i> , Th	<i>Mangifera</i> , L.	<i>Dracontomelum</i> , Bl.
<i>Solenocarpus</i> , W. &	<i>Daphnitis</i> , Sp.	<i>Erythrostigma</i> , Hsk	<i>Evia</i> , Bl.
[A.]	<i>Anaphrenium</i> ,	<i>Anacardium</i> , Rothb.	<i>Poupartia</i> , Comm.
<i>Schinus</i> , L.	[E. Mey.	<i>Cassuvium</i> , Rumph	

DOUBTFUL GENERA.

Wirtgenia, *Jung.*
Huertea, *R. & P.*

Rumphia, *L.*
Augia, *Lour.*

Sabia, *Colebr.*
Miniscosta, *Bl.*

GEOGRAPHICAL DISTRIBUTION.—These are frequent in the tropics both of the Old and New World, but they diminish towards the poles; so that on the shores of the Mediterranean, and at the Cape of Good Hope, they are rarely met with. A few are found in the south of Europe and in the warmer parts of North America, but they are entirely unknown in Australia.

PROPERTIES AND USES.—This family is distinguished by its resinous gummy juice, which in some resembles the turpentine of the Fir tribe, and in many it becomes black on exposure to the air, and is charged with an acrid substance, which is caustic and poisonous; but there are others which produce some of the finest fruits of tropical climates.

The *Pistachia Nut*, so common and so much esteemed in the south of Europe, is the produce of *Pistachia vera*, a tree about fifteen feet high, obtained originally from Syria, but now extensively cultivated in Spain, Italy, the south of France, and Sicily. The fruit is of the size and shape of an olive, but convex on one side and concave on the other, and with a rougher surface. It has a tender, crimson-coloured pulp, which is rather sparing, and encloses a nut which opens with two valves, disclosing a greenish kernel covered with a red pellicle. These nuts are sweet and agreeable; they enter into the composition of ragoûts and other dishes, and are used for flavouring ices and creams, besides being preserved incrusted in sugar and other forms of confectionery. The best come from Arabia and Syria, but large quantities are exported from Sicily. They are said to be very nourishing and wholesome, and they yield an oil by expression which is employed in making a sort of electuary for disorders of the stomach. It is from *P. terebinthus* that *Chio Turpentine* is obtained. This is a smaller tree than the preceding, and is a native of the south of Europe and northern Africa, but it grows abundantly in the islands of the Archipelago, and particularly in Chio. The turpentine is obtained by making incisions in the tree at distances of three inches, from the root even to the summit. This operation is performed in the month of July; and as the juice exudes it is received on stones, upon which it becomes so much condensed by the coldness of the night, as to admit of being scraped off with a knife, which is always done before sunrise. In order to free it from any foreign substances, it is again liquefied in the sun and passed through a strainer, after which it is fit for use. Each tree does not yield more than from eight to ten ounces; and hence, from the small quantity that each produces, this substance is very rare and costly, and is seldom ever met with without being adulterated. When pure, Chio turpentine is very thick, glutinous, and cloudy; of a greenish-yellow colour, with an agreeable odour, similar to that of fennel, and with a warm perfumed flavour without bitterness or acrimony. On exposure to the air it speedily thickens, and ultimately becomes concrete and hard in consequence of the loss of its essential oil, and when old it has a slight rancid smell. *P. atlantica* is a large, thick, round-headed tree, forty feet high, and a native of Barbary. It exudes from its trunk and branches a resinous gum, of a pale yellow colour, aro-

matic smell, and pleasant taste, and is called by the Moors *heule*. It becomes encrusted in cakes round the branches, and drops sometimes, in globules the size of the point of the finger, on to the ground. The Arabs collect this substance in autumn and winter, and chew it to give a pleasant smell to the mouth and brightness to the teeth. The nuts of the fruit of *P. oleosa*, a native of Cochin China, contain a yellow, bitterish, sweet-scented, thin oil, which thickens on exposure to the air, and is used by the natives to anoint their heads and to scent ointments.

P. lentiscus is the *Mastich Tree*. It is a native of southern Europe and of the north of Africa, where it is both wild and cultivated, and attains a height of twenty feet, but is generally not more than twelve feet high. In the island of Scio, in the Grecian Archipelago, the tree is cultivated with great care, and it is from there that mastich is chiefly obtained. In the beginning of August transverse incisions are made in the bark of the tree, from which the resin exudes, and either hardens in tears upon the bark, or drops on the ground, where it is received on cloths, or allowed to fall on the bare ground; but the tears are most esteemed. These are of various sizes, smooth, semi-transparent, and of a pale yellow colour, usually covered with a whitish powder, caused by rubbing against each other. *Mastich* is almost without smell, unless when rubbed or heated, and then it becomes fragrant. It is fusible and inflammable by heat, and alcohol dissolves about four-fifths of it, leaving a viscid substance, which becomes brittle when dried, and to which the name of *Masticin* has been applied. This substance, though not dissolved by alcohol, softens and swells up in it as gluten does in water. Mastich is wholly soluble in ether, chloroform, and oil of turpentine; scarcely soluble in the fixed oils, and insoluble in water. It is occasionally found adulterated with olibanum, sandarach, and other resinous substances, and in times of scarcity with sea-salt. As an internal remedy, mastich is now little used; it is employed chiefly to fill the cavities of caries teeth, for which it is well fitted by its softness, and the following mode of applying it may not be unacceptable to a great mass of our readers. Dissolve one part of mastich in one part of ether, in a bottle, well stopped. With the solution thus formed, which is of a yellow colour, and oily consistence, saturate a small piece of cotton of the size of the carious cavity, and having well cleansed and dried the cavity, introduce the cotton, without painful pressure, so as to fill it exactly. The ether is soon evaporated, and the resin remaining soft and adhesive, attaches itself to the diseased surface of the tooth, which it protects from the action of the air, and of the food taken into the mouth. The women, and even the men, of Turkey, chew this resin, particularly in the morning, not only to render their breath more agreeable, but to whiten the teeth and strengthen the gums; they also mix it with their fragrant waters, and burn it with other odoriferous substances in the way of fumigation. A brilliant varnish is made by dissolving mastich in alcohol or oil of turpentine; and a solution made by macerating half an ounce of mastich and fifteen grains of caoutchouc in two fluid ounces of chloroform, and filtering in close vessels, forms a varnish highly esteemed by some microscopists.

The species of *Comocladia*, or *Maiden Plum*, are all natives of the West Indies and the tropical parts of the adjoining continent. *C. dentata* yields a milky, glutinous juice, which becomes black on exposure, and which can-

not be washed from cloth. The tree is between twenty and thirty feet high, a native of Cuba and St. Domingo, where it is called *Guao*; and the inhabitants have an idea that it is dangerous to sleep under it. If ever so slightly wounded, it yields a most unpleasant smell. *C. integrifolia* also yields a juice which becomes black on exposure, and which dyes the hand of so dark a colour that it can with difficulty be washed out. With the berries of *Schinus molle*, or Peruvian mastich, the Peruvians make a vinous drink by boiling them; they also prepare a sort of honey and a kind of vinegar from them, according to the mode of management. It abounds in a resinous gum, which exudes from the stem, and is of the nature of mastich. The fresh leaves are also charged with this resin, and when immersed in water, discharge it with such violence that the recoil gives them a singular motion, which some have considered spontaneous; and thus, after rain, by the resin being emitted, the air is filled with fragrance. The fresh bark of *S. aroeiri* is used in Brazil to rub newly-made ropes, which it covers with a very durable dark-brown coating, and its juice is applied by the Indians in diseases of the eye. St. Hilaire says that it causes swellings in those who sleep under its shade. *Lithræa venenata* (*Rhus caustica*), the *Lithri*, or *Llithi*, is a shrub ten feet high, a native of Chili, and is so extremely poisonous that any one resting or sleeping under it at certain times of the year is afterwards attacked with eruptions all over the body.

The bark of *Rhus cotinus*, the *Wild Olive*, or *Venice Sumach*, is aromatic and astringent, and is enumerated as one of the substitutes for Peruvian Bark. The wood is much used in Greece for dyeing wool of a beautiful yellow colour, and constitutes what is called *young fustic*. The whole plant is used in Italy for tanning, and is there called *Scotino*. *R. metopium* yields a great quantity of gummy resin, which, when pure, is of a yellow colour, and after a short time acquires a hard, brittle consistence; and this it is which is considered by some the *Doctor's Gum*, or *Hog Gum* of Jamaica, of which we have spoken at page 149. This gum is in daily use for strengthening plaisters. Dissolved in water, it is an easy purgative, and thought to be extraordinarily diuretic. The fruit of *R. glabra* is used for dyeing red, and are perfectly harmless, being eaten by children in the United States with impunity. They are astringent and cooling, and an infusion of them has been recommended as a cooling drink in fevers, and as a gargle in ulceration and inflammation of the throat. They are very sour, and astringent, but not unpleasant. This sourness is owing to the large quantity of malic acid contained in the pubescence which covers their surface, as, when it is washed away by warm water, the berries are wholly free from acidity; and in such quantity is the acid obtained, that it has been recommended to procure it from this source. On cutting the stem, a yellow juice comes out between the bark and the wood. The bark, boiled with the fruit, affords a black, ink-like tincture; and both the bark and leaves are astringent, and may be used in tanning leather and in dyeing. Exerescences are produced under the leaves, resembling galls in character, and contain large quantities of tannic and gallic acids. These have been used, and found to be even preferable to oak galls. *R. pumila* is the most poisonous of the whole genus, and it is related that Lyon, the American botanical collector, was poisoned by it all over his body when merely collecting the seeds, and that he was lame for a considerable time. *R. succedanea*, a native of Japan

produces a fleshy fruit, about the size of a cherry. This contains a nut, from which, when warm, an oil is expressed, that acquires the consistence of suet, and serves for making candles. Thunberg states that the same oil is obtained from *R. vernix*. The trunk yields a varnish, but in small quantity, and therefore not worth collecting.

The *Japan Varnish-Tree* (*Rhus vernicifera*) is a native of Japan and Nepaul, and grows abundantly in the former country, where it furnishes the varnish with which the celebrated Japan lacquer-work is made. This varnish, which oozes out of the tree on its being wounded, is procured from stems that are three years old, and is received in some proper vessel. When first collected it is of a lightish colour, and of the consistence of cream, but grows thicker and black on exposure to the air. It is so transparent that, when it is laid pure and unmixed upon boxes and other pieces of furniture, every vein of the wood may be clearly seen; and for this purpose they make choice of the finest sorts of firs and cedars. A dark ground is generally spread underneath the varnish, which causes it to reflect like a looking-glass, and the deposit which is caught in the trough under a grindstone is frequently made use of to form the ground. At other times ground charcoal is used, and occasionally some darker red substance is mixed with the varnish, and sometimes leaf-gold, ground very fine, when it is called "salpikat." This lacquered work is afterwards for the most part embellished with gold and silver flowers and figures, laid on upon the varnish, but they are very liable to wear off in time. The varnish, which hardens to a transparent and difficultly soluble gum, will not endure any blows, but flies and cracks almost like glass, though it can stand boiling water without receiving any damage. With this they varnish over the posts of their doors, windows, and articles of furniture. It is much superior to Chinese and Siamese varnish. The expressed oil of the seeds becomes as hard as tallow, and with it the Japanese make their candles. *R. venenata* is the *Swamp Sumach*, or *Poison Wood* of America. It grows abundantly in swamps and low grounds from Canada to Carolina, and is by some supposed to be identical with the preceding species. This also yields a white juice, which exudes between the wood and the bark when the tree is wounded. It becomes permanently black on exposure to the air, and may be made to afford a brilliant, glossy, durable varnish, by boiling it sufficiently before applying it. The juice of the tree stains cloth black, and is with difficulty obliterated with frequent washings. The whole of this shrub is in the highest degree poisonous, but its effects are various on different individuals, and some may even handle it with perfect impunity. In those who come within its influence, the whole body is sometimes enormously swollen, and the patient for many days scarcely able to move; but the complaint almost always subsides spontaneously without destroying life. The poison is communicated by touching or smelling any portion of it. In forty-eight hours inflammation appears on the skin in large blotches, principally on the extremities and the glandulous parts of the body; soon after pustules arise in the inflamed parts, and fill with watery matter, attended with burning and itching. In two or three days the eruptions suppurate, after which the inflammation subsides, and the ulcers heal in a short time. *R. perniciosa* and *juglandifolia* possess the same poisonous properties.

Rhus coriaria is said to furnish the bark with which Turkey leather is

tanned. It is a native of the whole of the south of Europe, and its seeds and leaves are used in medicine as restringent, styptic, tonic, and cooling. The peasants of Podolia, the Ukraine, and other parts of Russia, use it both internally and externally in decoction along with *Genista tinctoria* as a preventive of hydrophobia. The Tripoli merchants sell the seeds at Aleppo, and they are in common use there to induce an appetite. The taste of the fruit is very acid and astringent, and does not possess the dangerous qualities for which some of this genus are so remarkable. From the berries of *R. semialata* the Chinese extract an oil by bruising them, and boiling them in water; they use it as a varnish, which is beautiful, but does not keep its polish. The leaves of *R. copallina* are used as tobacco by the Indians of the Mississippi and Missouri. This yields a resin, which was long considered to be the true Gum Copal, and hence Linnæus applied to it the specific name of *copallina*. Copal is a general term used in Mexico for a gum; but as this tree does not grow in Mexico, and as the resins yielded by those species of *Rhus* which do grow in that country have been ascertained to differ entirely from the copal of commerce, it may be concluded that the copal is not produced by this plant. *R. radicans* is a climbing shrub, very abundant in hedges and woods from Canada to Georgia. It rises to the tops of the highest trees, throwing out roots all along its stem, which penetrate the bark of the tree against which it grows. It is called *Poison Vine* in America. When the stem is cut, it emits a pale brown sap of a disagreeable scent, and so acrid that letters or marks made upon linen cannot be removed, but grow blacker the more they are washed. Like *R. venenata*, it is poisonous to some persons, though not to others, but in a less degree. Kalm relates of two sisters, that one could handle the tree with impunity, while the other could not come within three feet of it, or even stand to the windward of it at a greater distance, without feeling its exhalations; and that although it had not the slightest effect upon him, even when the juice had been squirted into his eyes, the skin of a person's hand which had been covered with it became as hard as a piece of tanned leather a few hours after the application, and ultimately peeled off in scales. *R. toxicodendron*, also a native of North America, and there called *Poison Oak*, is a shrub from one to three feet high. The juice has the same property of indelibly staining linen as the preceding, and the more it is washed the deeper it becomes. It deepens with age, and does not yield to water, or alcohol, either hot or cold, but is dissolved by ether. When the juice first exudes, it is milky, but becomes black on exposure to the air. Dr. Alderson, of Hull, used it in four cases of paralysis, in doses of half a grain or a grain three times a day, and in all, his patients recovered to a certain degree the use of their limbs. The first symptom of amendment was always an unpleasant feeling of pricking or twitching in the paralytic limbs, and it acts as a purgative, notwithstanding the torpid state of the bowels of such patients.

Rhus typhina is met with almost over the whole of the United States, and is called *Virginian Sumach*. It is from eight to twenty feet high, and the young branches are covered with a soft, velvet-like down, resembling a young stag's horn, both in colour and texture; and hence it has been called *Stag's-horn* and *Stag's-horn Sumach*. It has received the name of *Vinegar Plant*, from the double reason of the young plant, when fermented, pro-

ducing either new or adding to the strength of old vinegar, whilst its ripe berries afford an agreeable acid, which might supply the place, when necessary, of citric acid. The powerful astringency of this plant in all its parts recommends it as useful in several of the arts. The ripe berries boiled with alum make a good dye for hats. Every part of the plant may be used as a substitute for oak-bark in tanning, especially the white glove leather. It will likewise answer to prepare a dye for black, green, and yellow colours; and with the sulphate of iron it makes a good ink. The milky juice that flows from the incisions made in the trunk or branches makes, when dried, the basis of a varnish, little inferior to the Chinese. Bees are remarkably fond of its flowers, and it is said to afford more honey than any of the flowering shrubs. The natives of America use the dried leaves as tobacco.

The *Black Varnish-Tree* is *Melanorrhœa usitata*. It is a native of India, and grows in a large valley called Kadbbu, in the kingdom of Manipur, Silhet, and Tipperah, as well as in the Burmese empire, on the banks of the Irrawadi, where it is called *Theet-tsec*, or *Zit-si*; in Manipur it is called *Khew*. This has been considered the same as the varnish-tree of the Chinese. It is an immense tree, a hundred feet high, and yields a viscid, ferrugineous juice, which becomes black on exposure to the atmosphere. It is procurable in great quantities from Muniper, where it is used in painting river craft, and for varnishing vessels intended to contain liquids. The drug is conveyed to Silhet for sale by the merchants. On being handled it produces several erysipelous swellings, attended with pain and fever, but never of long duration. In the neighbourhood of Prome a considerable quantity of varnish is extracted from the tree, but very little at Martaban, owing, it is supposed, to the poorness of the soil, and owing also partly to there being none of the people in that part whose business it is to perform the process of collecting, although it is very simple, and is as follows:—Short joints of a thin sort of bamboo, sharpened at one end, and shut up at the other, are inserted in a slanting direction into holes made in the trunk and principal branches, and left there for twenty-four or forty-eight hours; after which they are removed and emptied into a basket, previously varnished over. Sometimes a hundred of these bamboo joints may be seen sticking into one tree during the collecting season, which lasts as long as the tree is destitute of leaves, namely, from January till April, and they are renewed as long as the juice will flow. A tree is reckoned to produce from ten to twelve pounds annually. Every article of household furniture intended to hold liquid or solid food is lacquered over with this varnish. The article to be varnished is prepared with calcined bones, after which the varnish is laid on thinly, either in its pure state or variously coloured. The process of drying is the most difficult part, being performed in a very slow and gradual manner, by the articles being placed in subterraneous vaults for several months. This substance is also used as a size glue in the process of gilding, nothing more being required than to besmear the surface of the article to be gilded, and immediately to apply the gold-leaf. When it is considered how very extensively that art is practised by the Burmah nation, it being among their most frequent acts of devotion and piety to contribute to the gilding of their numerous religious edifices and idols, it will be evident that a great quantity of this article must be consumed for that purpose alone. The beautiful Pali writing of the religious order

of the Burmahs on ivory, palm-leaves, or metal, is entirely done with this varnish in its native and pure state. From the bark of *Stagmaria verniciiflua*, a native of Sumatra, Borneo, and other East Indian islands, a resin exudes which soon becomes hard and black on exposure, and when collected is employed as varnish. Rumphius says that this is the true varnish-tree of Japan. It is extremely acrid, causing excoriations and blisters when applied to the skin, and the tree itself is considered not only dangerous to handle, but even to sleep under the shade of it. From *Holigarna longifolia* a varnish is also obtained, similar in properties to the preceding.

The *Cashew Nut* (*Anacardium occidentale*) is the type of this family. It is a small tree, sixteen feet high, a native of the East Indies, the West Indies, and South America; but it is supposed that the East and West Indian are two distinct varieties. The fruit of this tree is formed by the enlargement of the footstalk of the flower, and is about the size of a large orange, with an agreeable subacid flavour and a slight astringency. It is sometimes of a yellowish and sometimes of a red colour. The juice expressed from it and fermented yields a pleasant wine, which, when distilled, a spirit is drawn from it superior to arrack or rum, making an admirable punch, and acting powerfully as a diuretic. They are eaten when ripe, and frequently roasted for mixing in punch, to give it a pleasant flavour. At the end, and on the outside of this fruit, grows a kidney-shaped nut, an inch or more in length, and three-quarters of an inch broad, consisting of two shells. The outer is of an ash colour, and very smooth; under this is another, which covers the kernel, and between them there is a thick black juice, which is very caustic; but the kernel, when fresh, has a most delicious taste, and abounds with a sweet milky juice. They are eaten like chesnuts, either raw or roasted. These nuts are what are known as *Cashew Nuts*. The juice which they contain is extremely acrid and corrosive, producing, when applied to the skin, severe inflammation, followed by blisters; and it has often proved very troublesome to those who incautiously put the nuts into their mouth to break the shell. It has been used with great success in destroying ring-worm, cancerous ulcers, and corns; but it ought to be applied with caution. It has been used by young ladies in the West Indies as a cosmetic, when they have fancied themselves too much sun-burnt, preferring to torture themselves rather than carry about with them a tanned complexion. They take a nut, and, after scraping off the thin outside skin, rub their faces over with it. The acrid juice immediately causes the face to swell and become black, and the skin being poisoned by the juice, will, in the space of five or six days, come off in large flakes, so that they cannot appear in public in less than a fortnight, by which time the new skin looks as fair as that of a new-born child. The juice has been examined chemically, and found to contain two peculiar principles—one having acid properties, and called *anacardic acid*, and the other a yellow oleaginous liquid called *cardol*. The broken kernels are sometimes imported for mixing with old Madeira wines, the flavour of which they improve. They are also used in puddings, and they form excellent chocolate when mixed with cocoa; but when kept too long, they shrivel and lose their flavour and best qualities. The thick juice of the shell tinges linen a good black colour, which cannot be washed out; and if wood is smeared with it, it is protected from decay.

The milky juice which exudes from the tree after incision stains linen of an indelible black, which no washing will remove; and it also yields from five to ten or twelve pounds of a fine transparent gum, similar to gum arabic, and not inferior to it in virtue and quality, which perhaps renders it in some respects more valuable.

Scmeccarpus anacardium is a large tree, fifty feet high, a native of the mountains of the East Indies, and is called *Marking Fruit*. What constitutes the fruit is the swollen receptacle, which, when ripe, is yellow, and is roasted in ashes and eaten by the natives. They have the flavour of roasted apples; but when unroasted they taste astringent and acrid, leaving a painful sensation on the tongue for some time. When unripe, it may be made into good bird-lime by pounding it. The nut is heart-shaped and seated on the receptacle, black, and consists of a cover or shell composed of two skins—an outer and an inner—and a kernel. Between the two skins is contained a black, acrid, resinous juice, which, before it is ripe, is of a pale milk colour. This black acrid juice of the shell is by the natives applied externally to remove rheumatic pains, aches, and strains. In tender constitutions it often causes inflammations and swelling, but where it does not produce these effects, it is an efficacious remedy. It is employed by the Telinga physicians in the cure of almost every kind of venereal complaint. It is in general use for making cotton cloths, and the colour is improved and prevented from running by a little mixture of quick-lime and water. The juice is not soluble in water, and is only diffusable in spirits of wine, for it soon falls to the bottom unless the menstruum be previously alkalisied, but then the solution is pretty complete, and of a black colour. It sinks in fixed oils and unites perfectly with them, but the alkaline solution acts upon it with no better success than plain water. The kernels are rarely eaten. The wood is reckoned of no use, not only on account of its softness, but also because it contains much acrid juice, which makes it dangerous to cut down and work upon. *Buchanania angustifolia* produces fruit the size of a large cherry, and *B. latifolia* possesses the same resinous properties as some of the rest of the family.

Somewhat different in character from the rest of the family is the *Mango* (*Mangifera indica*), Fig. 90, so celebrated for its fruit in tropical climates. It is a native of the East Indies, but is now cultivated in all countries where it will thrive. The tree is fifty feet high, with a spreading top, and when in flower is not unlike the sweet chesnut. The fruit, when fully ripe, is oval, or somewhat kidney-shaped, and flat, varying in size from that of a small apple to a goose's egg; of a yellow or reddish colour, speckled with black, and filled with a fine agreeable juice. Some are full of fibres, and the juice runs out of these on cutting, or with a little handling; but those which have few or no fibres are much the finest; they cut like an apple, but are more juicy, and have a rich sweet-perfumed flavour, accompanied with a grateful acidity. It is eaten without any preparation, except taking off the rind with the fingers or a knife, and is esteemed a very wholesome fruit, superior to the finest fruits of India, with the exception of the Mangosteen and some of the finest pine apples. Gentlemen within the tropics eat hardly any other fruit in the hot months, but if no wine be drank with it, the Mango is apt to throw out boils, at least with new-comers, which are, however, conducive to health. Jellies, preserves, tarts, &c., are made from

the unripe fruit in India. Preserved in sugar, it is not unfrequently served up at the tea-table. When unripe, it is very sour; and in this state, boiled with sugar, butter, and eggs, it yields an acrid juice, that tastes like boiled apples or gooseberries. The Javanese boil the unripe fruit in brine, which taste and are used as olives; others boil them and steep them in vinegar and pepper, to eat with meat like cucumbers. It is only the unripe fruit which comes to Europe in the form of a pickle. There are several other species of *Mangifera* which produce eatable fruit, but they are all inferior to even the worst of *M. indica*. *M. sylvatica*, besides being eaten, is dried by the natives of India, and kept for medicinal purposes. The fruit of *M. oppositifolia* is the size of a small pullet's egg, and is universally eaten in Burmah.

The *Hog-Plums* (*Spondias*) are natives of the West Indies and South America, and produce fruit which is eatable. *S. purpurea* has fruit about an inch in length, ovate or oblong, purple, or variegated with yellow. The pulp is yellow, and has a singular but agreeable acid, aromatic flavour, but is not held in much estimation by the Europeans resident in the West Indies. The tree is variable in size, and attains the extreme height of from thirty to forty feet. The boughs are set in the ground when in flower as hedges, and in the course of two or three months they are laden with fruit. It is called *Spanish Plum Tree*. The fruit of *S. lutea* is yellow, and as large as a plum. The flesh is of an agreeable and aromatic flavour, eaten by children and some of the inhabitants, but furnishing excellent food for hogs. There is a variety of this, which is more highly esteemed by most persons. This also is used for hedges, which are formed by simply sticking the branches in the ground, and one or two are planted in pastures, to afford shade for sheep. The *Otaheite Apple* (*Poupartia dulcis*) is a native of Java, Moluccas, and the Society Islands. The tree grows thirty feet high, and produces a large smooth fruit, of a golden yellow colour, and a somewhat nauseous, fetid smell, containing a sweet, aromatic, succulent pulp. The tree is cultivated to a great extent in the Friendly and Society islands, especially in Otaheite, for the sake of its fruit, which is esteemed one of the most wholesome. It has almost the flavour of a pine apple, and not only assuages thirst, but is given to the sick without distinction.



ORDER LXVIII.—AMYRIDACEÆ—THE INCENSE TREES.

TREES or shrubs with a resinous juice. *Leaves* alternate or opposite,



Fig. 91. *Balsamodendron Myrrha*.

sometimes wanting. *Stigma* with as many lobes as there are cells in the ovary. *Fruit* a drupe, one to five-celled, with its outer part splitting into valves. *Seed* without albumen. *Embryo* with plaited or wrinkled, rarely smooth, seed-leaves, and with a short, straight, superior radicle.

TRIBE 1. *Bursereæ*.—Ovaries with more than one cell.

GENERA AND SYNONYMES.

<i>Boswellia</i> , Roxb.	<i>Ganophyllum</i> , Bl.	„ <i>Nioutoutt</i> , Ad.	<i>Elaphrium</i> , Jacq.
<i>Libanus</i> , Col.	<i>Balsamodendron</i> .	<i>Balsamea</i> , Glad.	<i>Icica</i> , Aubl.
<i>Plösslea</i> , Endl.	[<i>Kunth</i> .	<i>Balessam</i> , Bruce.	<i>Bursera</i> , Jacq.
<i>Protium</i> , Burm.	<i>Heudelotia</i> , A. R.	<i>Commiphora</i> Jacq.	<i>Trattinickia</i> , W.

? <i>Daeryodes</i> , Vahl	<i>Canarium</i> , L.	„ <i>Tetragastris</i> , Gärt	<i>Knorrea</i> , M. & S.
<i>Santiria</i> , Blume.	<i>Colophonia</i> Comm	<i>Schwägrichenia</i> ,	<i>Garuga</i> , Roxb.
<i>Marignia</i> , Comm.	<i>Pimela</i> , Lour.	[<i>Reichb.</i>	<i>Kunthia</i> , Dennst.
<i>Dammara</i> , Gärt.	<i>Hedwigia</i> , Sartz.	<i>Caproxylon</i> , Juss	<i>Hemprichia</i> , Ehrenb

DOUBTFUL OENERA.

<i>Balanites</i> , Del.	<i>Methyscophyllum</i> ,	<i>Jonquetia</i> , Schrb	<i>Triceros</i> , Lour.
<i>Pieramnia</i> , Sartz.	[<i>E. & Z.</i>	<i>Loureira</i> , Meisn.	<i>Barbylus</i> , P. Br.
	<i>Tapiria</i> , Juss.	<i>Toluifera</i> , Lour.	<i>Pachylobus</i> , G. Don

TRIBE 2. *Amyrideæ*.—Ovaries with only one cell.

GENUS AND SYNONYMES.

<i>Amyris</i> , L.	„ <i>Elemifera</i> , Plum.	„ <i>Lucinium</i> , Pluckn.
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GEOGRAPHICAL DISTRIBUTION.—These are all inhabitants of the tropics, and are distributed pretty equally throughout both hemispheres, but rather more numerous in Africa.

PROPERTIES AND USES.—The juice, which is either naturally exuded from these plants, or flows from them after incision, is without acidity, with a balsamic odour, stimulating and tonic in its virtues, and hardens in the form of tears, on exposure to the air. Among them we have the plants yielding frankincense, myrrh, and several other resinous substances.

It is now a pretty well-ascertained fact that the resin called *olibanum*, which is the frankincense used by the Jews, and other ancient churches in their religious ceremonies, is the produce of *Boswellia serrata*, and *B. papyrifera*, and not, as Linnæus supposed, of *Juniperus lycia*. The first of these is a native of Amboyna, and several of the mountainous parts of India, growing to the height of forty feet, and yielding what is called *Indian olibanum*. The second is found on the east coast of Africa, in Abyssinia, growing at an elevation of 1000 feet, on the bare limestone rocks, to which the roots attach themselves by a thick mass of vegetable substance, thrown out from the base of the stem, which sends roots into the crevices of the rock to an immense depth. Its bark consists of four layers, the two middle ones being of a fine texture, transparent like oiled paper, and employed by the Soumalis to write upon. It is this tree which produces the *African Olibanum*. Indian Olibanum is in the form of yellowish, somewhat translucent, roundish tears, larger than those of the African, and generally covered with a whitish powder, produced by friction. It has a balsamic, resinous smell, and an acid, bitterish, somewhat aromatic taste. When chewed, it softens in the mouth, adheres to the teeth, and partially dissolves in the saliva, which it renders milky; and it burns with a brilliant flame and a fragrant odour. Arabian or African Olibanum is in the form of yellowish tears, and irregular reddish lumps or fragments. The tears are generally small, oblong, or roundish, not very brittle, with a dull and heavy fracture, softening in the mouth, and bearing much resemblance to mastich; from which, however, they differ in their want of transparency. The reddish masses soften in the hand, have a stronger taste and smell than the tears, and are often mixed with fragments of bark, and small crystals of carbonate of lime. Alcohol dissolves nearly three-fourths of olibanum, and the tincture is transparent. It is chiefly employed for fumigations, and enters into the composition of some popular plasters; it

is also considered stimulant, like the other resins. A coarse resin is obtained from *Boswellia Glabra*, which is used, boiled with oil, for pitching the bottoms of ships.

Balm of Gilead is obtained from *Balsamodendron Gileadense*, Fig. 92, a



Fig. 92. *Balsamodendron Gileadense*.

smallevergreen tree, about fourteen feet high, growing on the Asiatic and African shores of the Red Sea; it is the same which is also called *B. opobalsamum*. The tree yields a resinous juice, which is known by the names of *Balm of Gilead* and *Balm of Mecca*, and is obtained from cracks in the smaller branches, from which it exudes in the month of April, and is collected by placing vessels under them to collect the resin as it falls; and a tree will not yield more than ten or fifteen drachms in one

season. The natives use it as a sudorific, particularly in rheumatism, and as a cosmetic; but they adulterate it on the spot; and hence, in Western Europe, it is seldom found in a state of purity. Lady Mary Wortley Montague states, that even at Constantinople, balm of the best quality is not easy to be got. That on applying some of it to her face, it became swollen and red during three days; but that her complexion was much improved by the operation; and that the ladies all use it in Constantinople, and have the loveliest bloom in the world. An inferior balsam is obtained by boiling the twigs in a quantity of water, and the balsamic matter rising to the surface is skimmed off. After they have procured all they can, it is said that they increase the heat, and a large quantity of thicker balsam, like turpentine, rises, which is preserved by itself, and is that which is principally met

with in Europe. The other can only be obtained by presents; and that which naturally exudes from the tree being so small, is hardly sufficient to supply the ladies of the seraglio and great officers. Bruce, in his "Travels," states that the young shoots were formerly cut off and tied up in faggots, and sent to Venice to make the Theriaca, or Venice treacle, when bruised or submitted to the action of the heat. There were three productions obtained from the tree which were held in high esteem by the ancients; the first was called *Opobalsamum*, or juice of balsam, which was the finest kind, composed of the greenish liquor, found in the kernel of the fruit; and the next was *Carpobalsamum*, made by the expression of the fruit when at maturity; the third was *Xylobalsamum*, and was the most inferior, being an expression or decoction of the young twigs of a reddish colour. But the principal quantity of balsam at all times was produced by incision, as at the present day. The wound is made by an axe, when the sap is in greatest abundance, in July and August. It is then received into small earthen bottles, and every day's produce is poured into a larger, which is kept closely corked.

Balsamodendron Myrrh, Fig. 91, yields the gum resin, called *myrrh*. It is a small tree, with a stunted trunk, covered with a whitish-grey bark, and furnished with rough abortive branches, terminating in spines. It grows in Arabia Felix, in the neighbourhood of Gison, in dwarfish thickets, interspersed among acacias and euphorbias. The juice exudes spontaneously, and hardens on the bark. *Myrrh* is in small, irregular fragments, or tears, or in larger masses very irregular in shape and size, being sometimes not larger than a pea, and sometimes though rarely as large as the fist; when of good quality, it is reddish yellow, or reddish brown, and translucent, of a strong, peculiar, somewhat fragrant odour, and a bitter, aromatic taste. It is brittle and pulverizable, presenting, when broken, a shining surface, which in the larger masses is very irregular, and sometimes exhibits opaque, whitish, or yellowish veins. It is partly soluble in water, alcohol, and ether; and either alcohol or water will extract the whole of its odour and taste. By distillation a volatile oil rises, having the peculiar flavour of *myrrh*, and leaving the residue simply bitter. *Myrrh* is a stimulant tonic, and is employed as an expectorant and emmenagogue in debilitated states of the system, in the absence of febrile excitement, or acute inflammation.

From *Balsamodendron Makul*, Fig. 93, and *B. Africanum*, the gum resin, called *bdellium*, is obtained; that from the former being the *Indian bdellium*, and that of the latter *African bdellium*. The former grows abundantly in Seinde, and other parts of India. It is a small, stunted tree, from four to six feet high, and the resin is obtained by making incisions in the tree with a knife, and allowing it to drop on the ground—hence its usual dirty state. *B. africanum*, called also *Heudclotia africana*, is found growing in Senegal and Guinea, on the west, and in Abyssinia, on the east coast of Africa; and the resin which it yields comes sometimes mixed with gum arabic and gum senegal. It is generally in small roundish pieces, of a reddish colour, semi-transparent and brittle, with a wax-like fracture, tenacious, and adhering to the teeth when chewed. It has an odour and taste like *myrrh*, but weaker. It is infusible and inflammable, diffusing while it burns a balsamic odour. In its medical properties it is

analogous to myrrh, and was formerly used for the same purposes. The



Fig. 93. *Balsamodendron Makul*.

Affghans mix the resin with "hajree flour," and make it into cakes, which they give their horses when they have a cold. The resin is also burnt as an incense, and mixed with the mortar and plaster, used in the construction of houses of a somewhat superior description, when durability is an object. There is a red, sweet-scented powder, obtained from *B. kataf*, a native of Arabia Felix, with which the Arabian women wash and cleanse their heads. The balsam obtained from *B. kafal* is purgative.

The resinous substance known by the name of *Tacamahac* is supposed to be obtained from *Elaphrium tomentosum*, but there are other plants belonging to this family which yield the same or a similar substance; and from several species of *Elaphrium* fragrant resins

are obtained. *Tucamahac* is a resinous gum, which exudes spontaneously from the tree above-named, and hardens on exposure to the air. It is in irregular-shaped pieces from the size of small shot to an inch or an inch and a half in diameter, and of a yellow or reddish-brown colour; the pieces are generally translucent, though frequently covered with powder on their surface, so as to render them opaque. It is heavier than water, brittle, and pulverizable, with an agreeable resinous smell, and a bitter, balsamic, and somewhat acrid taste; and, melted by heat, it exhales a strong odour. *Tacamahac* is partially soluble in alcohol, and completely so in ether and the fixed oils. It was formerly highly esteemed as an internal remedy, but is now employed medicinally only in the composition of ointments and plasters, and seldom even for this purpose; but it is frequently used as incense. From *Elaphrium Jacquinianum* and *E. excelsum* a resinous fragrant gum is also obtained, which bears a close resemblance to the above; and Dr. Royle says that the *Mexican Gum Elemi* is obtained from a tree which he has named *E. clemiferum*.

Brazilian Elemi is supposed to be the produce of *Icica icicariba*, which

yields the resin in great abundance from incisions made in the trunk. It is collected every twenty-four hours, and put into a cask or wooden vessel which will contain two or three hundred pounds. It is at first soft and unctuous, but becomes hard and brittle by cold or from age. It is semi-transparent, of a yellowish-white colour, mixed with white points, and of a strong agreeable smell like that of fennel, which is owing to a volatile oil obtained by distillation. As its properties reside in this oil, it should be chosen fresh, of a good smell, and not too dry. It is entirely soluble in alcohol, except some impurities and a white residue, which has been found to be a dry resin, soluble only in warm alcohol, and crystallizable by the influence of cold. This substance thus obtained is white, opaque, very light, inodorous, and insipid, and has been called *Elemine*. Brazilian elemi is now found to be very much adulterated with pitch, which can be detected by its greater opacity and smell. The juice which is got by incision from *Icica heterophylla* is yellow, balsamic, and aromatic, resembling turpentine, and remains fluid for a long time after being exposed to the air. It forms the *Balsam* or *Resin Acouchi*, which is highly aromatic, mottled with white, and semi-transparent. It furnishes from a sixteenth part of its bulk a crystallizable resin less soluble in alcohol, and which is phosphorescent when rubbed. It is obtained in great quantity, and the inhabitants of Guiana use it to cure wounds. They always carry along with them the small fruit, which retain their scent, and which they send as presents to their friends as something precious. The Caribbees perfume with the balsam the oil of carabe and fecula of annotta mixed together, with which they anoint their bodies as well as their hair to preserve them against rain and the bites of insects. The balsam procured from *I. guianensis* and *I. heptaphylla* is very fragrant and colourless, and hardens into a grey resin. It is used in dysentery, and burned as incense in churches, and in houses as a perfume; so are also the resinous products of *I. tacamahaca*, *I. decandra*, and *I. enneandra*. *I. allissima* is an immense tree a hundred feet high, a native of the forests of Guiana. There are two varieties of it, one called the *Red* and the other *White Cedar*, and known under the names of *Acuyari*, *Samaria*, *Mara*, and *Curana* wood; but the wood of the former is considered more durable than the latter. It is used for household furniture and carpentering, and canoes and boats made with it last longer than those made of the white. It is light, easily worked, and very aromatic; and canoes forty-two feet long and five feet and a half wide have been made from a hollowed trunk of a single tree.

Bursera gummifera, a large tree eighty feet high, a native of the West India islands, exudes a clear transparent resin, which hardens on exposure and has the appearance of mastich; but by incision it yields a considerable quantity of a more fluid substance, which has much the smell and appearance of turpentine, and may be used for the same purposes. It is called by the French *Resin de Gommart*, and also *Chibou* and *Cachibou*. The timber of *B. serrata* is close-grained and hard, and is much esteemed for furniture by the natives of Bengal, where it is found native in the woods. It is as tough and heavier than oak. *B. acuminata* and *B. leptophleas* are both charged with a resinous gum, that of the first forming *Gum Caranna* according to some; but, according to Humboldt and Guibourt, this is believed to be the produce of *Icica carana*, while Dr. Hanceock thinks it comes from *Aniba cedrota*. It is in pieces of the size of a nut, variously compressed,

hard, but appearing to have a certain softness. It is of a greenish black colour, or dark brown colour, internally, somewhat shining and translucent, brittle and pulverizable when dry, but in the recent state soft and adhesive like pitch; when bruised it has the odour of pine resin and tacamahac mixed, an agreeable balsamic odour when heated, and a bitterish resinous taste. It melts easily with heat, and is entirely dissolved in alcohol.

Canarium commune, which grows in the East Indies and Moluccas, and is cultivated for the sake of its fruit, is conjectured by Dr. Royle to yield the *Manilla Elemi*. It is a large tree fifty feet high, and its fruit forms an article of food among the natives. It is eaten in the same way as almonds are in Europe; but they are considered very unwholesome if eaten fresh, which is known by the exterior pellicle being of a pale white colour with purple streaks instead of reddish, and then they cause diarrhœa and dysentery. They are eaten both raw and roasted; and in Amboyna they are converted into bread, which is made in rolls about a yard in length and an inch thick; they are also made into a sort of marmalade. An oil is expressed from them, which is used at the table when fresh, and in lamps when stale. *C. sylvestre* also produces fruit, the kernels of which are eatable. *C. microcarpum* yields, by incision of the trunk, a viscid, odorous, yellowish oil, very like capaiva, which is mixed with Chinese varnish and used medicinally; it is vulnerary and resolvent. It is frequently used in the naval yards, and is commonly called *Damar*; mixed with a little chalk, and used with oakum made of the bark of reeds, it fills up the seams in ships and boats, and becomes as hard as a piece of stone.

Elemi is a gum resin in masses of various consistence, sometimes solid and heavy like wax, sometimes light and porous, unctuous to the touch, and translucent; of various colours, generally greenish intermingled with points of white or yellow, sometimes greenish white with brown stains, sometimes yellow like sulphur; fragile and friable when cold, softening by the heat of the hand, of an aromatic, somewhat turpentine odour, which diminishes with age, and in some varieties is said to resemble that of fennel. It is of a warm, slightly bitter, disagreeable taste; entirely soluble, with the exception of impurities, in boiling alcohol. It is sometimes adulterated with colophony and turpentine, and it has properties somewhat similar to the latter. It is generally employed in the composition of various plasters and ointments. The fruit of *Canarium pimela* and *C. album* are pickled and used like olives, being similar to them both in taste and form, and are considered very wholesome, especially the latter.

Hedwigia balsamifera is found in the woods and mountains of St. Domingo, and there called *Bois de cochon* or *Wild Boar's Tree*, because, it is said, these animals, when wounded, strip off the bark and heal their wounds by rubbing against the gum which exudes from it, and hence it may be regarded as another source of the *Hog Gum*. The resin which is obtained from this tree is called *Baume de sucrier* and *Baume à cochon*, and is liquid, transparent, of a pretty deep red colour, a strong, aromatic, and rather agreeable smell. Its virtues are very similar to those of Balsam of Capaiva; and Guibourt is of opinion that it is very much the same as that which is mentioned in many works under the name of *Baume Rakasira*. *Garuga pinnata* is a deciduous tree, sixty feet high, growing in the mountains of the East Indies. The wood is soft and spongy, and very little used;

but the fruit is eaten raw by the natives; and although it has a rough, austere taste, which renders it unpalatable as taken from the tree, it is well suited for pickling. The leaves of *Balanites Egyptiaca* are slightly acid, and are said to be anthelmintic. The unripe fruit is acrid, bitter, and purgative, but when ripe it may be eaten without inconvenience. A fixed oil is expressed from its seeds, called *Zachun*. The fruit of *Pachylobus edulis* is much esteemed by the inhabitants of the island of St. Thomas in the Gulf of Guinea, where it is sold in great quantities in the markets of St. Ann de Chaves under the name of *Safu*. It has a bitter and astringent taste, and is usually roasted.

Amyris sylvatica yields a kind of turpentine juice, which has been erroneously supposed to be Gum clemi. With much better reason is *A. Plumieri* given as one of the sources from which it is obtained. The clemi which is said to be produced by this tree comes in cakes of from one to two pounds weight, and wrapped up in palm-leaves or the leaves of Canna. It is drier than Brazilian clemi and has less smell, but possesses the same properties. The same substance is yielded by *A. hexandra*. *A. toxifera* exudes a juice which is as black as ink, and said by the inhabitants of Carolina to be poisonous. It is called *Janca Tree*, and is said to yield very valuable timber, which bears a fine polish and has a pleasant smell. The berries have the taste of Balsam of Capaiva. An infusion of the leaves has a very pleasant flavour, is highly cephalic, and is particularly restorative to weak eyes. The bark of *A. papyrifera* is used by the Nubian Mahomedans for writing their legends upon.



ORDER LXIX.—CONNARACEÆ—THE CONNARUS FAMILY.

TREES or shrubs. *Leaves* compound, dotted, alternate, and without leaflets at the base. *Flowers*, Fig. A, hermaphrodite, rarely unisexual, arranged in terminal racemes or panicles, and furnished with bracts. *Calyx* five-lobed, regular, permanent, and either valvate or imbricate in æstivation. *Petals* five, inserted in the calyx, imbricate, rarely valvate in æstivation. *Stamens* twice the number of the petals, inserted in the receptacle; those opposite the petals shorter than the others, usually united at the base. *Ovary*, Fig. B, either simple and solitary, or several together, each with a separate style, and the wide, obtuse, entire stigma; *ovules* two, collateral, ascending. *Fruit*, Fig. C, composed either of a single or several capsules, which open lengthwise internally. *Seeds* erect, in pairs or solitary, furnished with a fleshy aril. *Embryo*, Fig. D, with or without *albumen*; radicle superior, at the extremity most remote from

Fig. 94. *Connarus pubescens*.

the hilum; seed-leaves thick in the species without albumen, and leafy in those with albumen.

GENERA AND SYNONYMES.

Connarus, L.
Rourea, Aubl.
Robergia, Schrb.
Malbrancia, Neck.
Santaloides, L.

Omphalobium, Gärt.
Connarus, Kunth.
Byrsocarpus, Schm.
Tapomana, Ad.
Cnestis, Juss.

? *Thysanus*, Lour.
 ? *Suriana*, Pl.
 ? *Regiostachys*, Planchon.

GEOGRAPHICAL DISTRIBUTION.—They are all natives of the tropics, and are more plentiful in America than in Africa and Asia.

PROPERTIES AND USES.—Some of the species of *Omphalobium* have a fleshy aril, which is eatable, and their seeds are oily. *Omphalobium Lambertii* is a native of the interior or sandy savannahs of Guiana, and is said by Schomburgk to supply the *Zebra wood* of the cabinet makers.



ORDER LXX.—LEGUMINIFERÆ—POD BEARERS.

HERBS, shrubs, and trees, with very variable habits, and often of colossal dimensions. *Leaves* alternate, compound or de-compound, sometimes simple. It is rarely that the leaflets are abortive, and the petiole, being enlarged, is converted into a sort of simple leaf. They are furnished with two leaflets at their base,

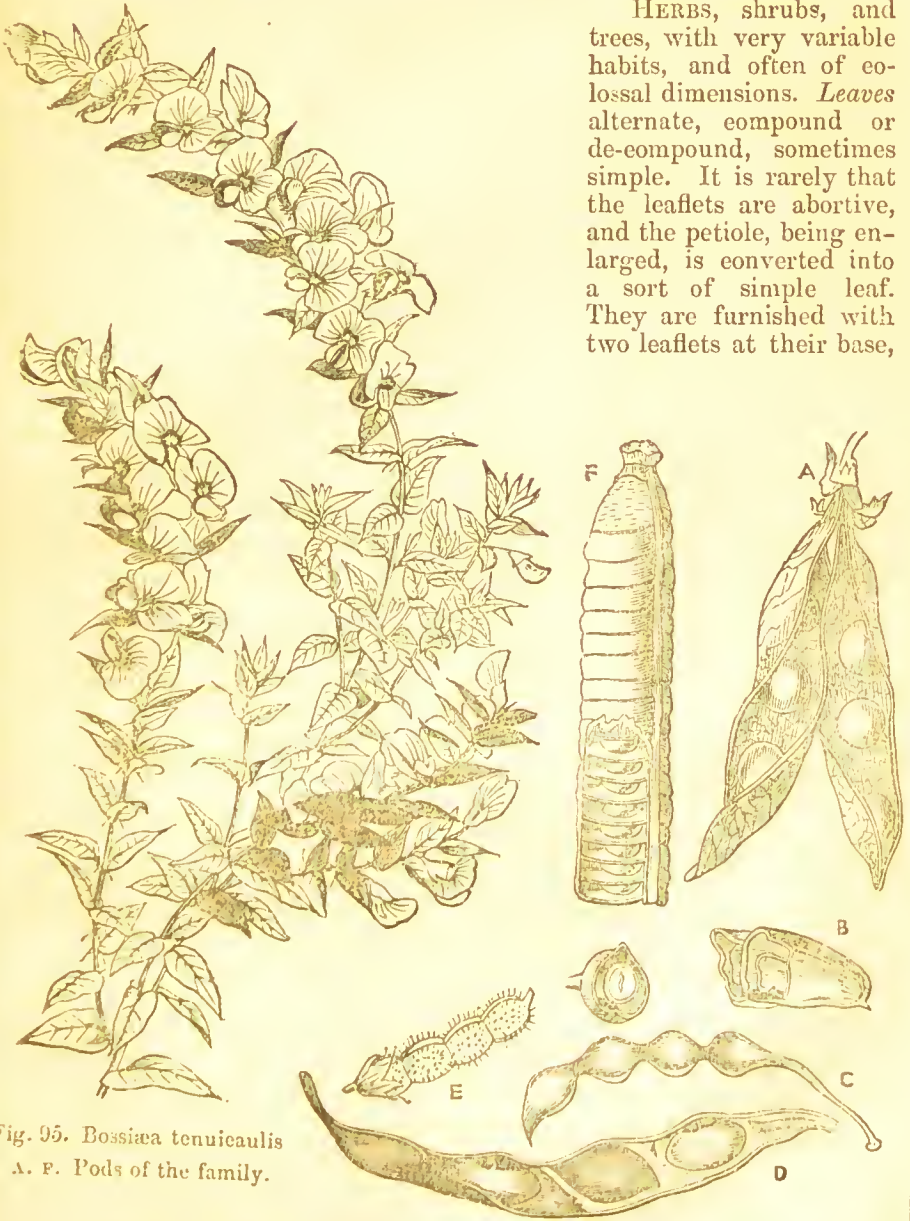


Fig. 95. *Bossiaea tenuicaulis*
A. F. Pods of the family.

which are sometimes permanent, as in *Robinia*. *Flowers* hermaphrodite, irregular. *Calyx* sometimes tubular, with five unequal teeth, sometimes

more or less deeply five-lobed, occasionally two-lipped; on the outside of it there are sometimes either one or more bracts, or a calyx-like involucre. *Corolla*, which is sometimes wanting, composed, in a great number of genera, of five generally unequal petals, of which one, being superior, larger, and enveloping the others, is called *the standard*; two lateral, called *the wings*; and two inferior, more or less united, are called *the keel*; and this is a papilionaceous corolla. Sometimes it is of five almost equal petals. *Stamens* generally ten, occasionally more, generally united by their filaments into two bundles, rarely into one, or entirely free; and inserted with the petals on the calyx, rarely in the receptacle. *Ovary* more or less stipitate at the base, free, generally simple, one-celled, many-ovuled; style placed latterly, often curved backwards, and terminated by a simple stigma. *Fruit* always a pod, generally dry, membranous, many, rarely one-seeded, opening in two valves, either by the ventral suture, or which separate from the base to the summit, as in *Carmichaelia*; or unopening, as in *Sophora*. It is generally one-celled, but sometimes longitudinally two-celled, from the upper suture being bent in so much; or often transversely many-celled, in consequence of the seeds being separated by a spongy or membranous substance, often separating into one-celled joints, and frequently one-celled from contraction of the pod, as in *Desmodium*. *Seeds* usually numerous, rarely solitary or twin from abortion, fixed to the upper suture of the pod, and alternately inserted in both valves. *Embryo* without albumen, sometimes straight, and sometimes with the radicle curved back on the edge of the seed-lobes, which are leafy and flat, and in germination either remain in the seed-skin or throw it off.

TRIBE 1. *Podalyriæ*.—Corolla papilionaceous. Stamens ten, free. Pod two-valved, rarely unopening, but when it is so it is shorter than the calyx. Seed-lobes of the embryo leafy in germination; radicle incurved. Leaves simple or trifoliate, rarely unequally pinnate.

SUB-TRIBE 1. *EUPODALYRIEÆ*.

GENERA AND SYNONYMES.

1. <i>Cistropieal</i> .	<i>Baptisia</i> , Vent.	<i>Aphora</i> , Neck.	<i>Oxylobium</i> , Andr.
<i>Anagyris</i> , L.	<i>Podalyria</i> , Rich.	3. <i>Australian</i> .	<i>Podolobium</i> , R. Br.
<i>Piptanthus</i> , S.	<i>Crotalopsis</i> , Mx.	<i>Brachysema</i> , R. Br.	<i>Isotropis</i> , Benth.
<i>Pickeringia</i> , Nutt.	2. <i>Cape</i> .	<i>Callistachys</i> , Vent.	<i>Callistachya</i> , Sm.
<i>Thermopsis</i> , R. Br.	<i>Cyclopia</i> , Vcnt.	<i>Jansonia</i> , Kippist.	<i>Orthotropis</i> , Benth.
<i>Thermia</i> , Nutt.	<i>Podalyria</i> , Lam.	<i>Cryptosema</i> , Meisn.	<i>Chorozema</i> , Lab.
<i>Scolobus</i> , Raf.			<i>Gompholobium</i> , Sm

SUB-TRIBE 2. *PULTENEÆ*.

GENERA AND SYNONYMES.

<i>Burtonia</i> , R. Br.	<i>Sphærolobium</i> , Sm.	<i>Eutaxia</i> , R. Br.	<i>Pultenæa</i> , Smith.
<i>Jacksonia</i> , R. Br.	<i>Röca</i> , Hügel.	<i>Gastrolobium</i> , R. Br.	<i>Pultenaja</i> , Hoff.
<i>Leptocytisus</i> , Meis.	<i>Phyllota</i> , DC.	<i>Euchilus</i> , R. Br.	<i>Hymenota</i> , DC.
<i>Daviesia</i> , Sm.	<i>Aotus</i> , Smith.	<i>Spadostyles</i> , Benth.	<i>Latrobea</i> , Meisn.
<i>Viminaria</i> , Sm.	<i>Dillwynia</i> , Sm.		

SUB-TRIBE 3. *MIRBELIÆ*.

GENERA.

<i>Mirbelia</i> , Smith.	<i>Dichosema</i> , Benth.	<i>Leptosema</i> , Benth.
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TRIBE 2. *Loteæ*.—Corolla papilionaceous. Stamens ten, in one or two bundles. Pod two-valved, continuous, one-celled, rarely two-celled,

from the upper suture being bent inwards. Seed-lobes of the embryo leafy in germination; radicle incurved. Leaves simple, or palmate, with from three to five leaflets; rarely unequally pinnate.

SUB-TRIBE 1. GENISTEÆ.—Stamens united in one bundle. Leaves simple, palmately trifoliate, rarely pinnate. Stems usually shrubby.

GENERA AND SYNONYMES.

<i>Hovea</i> , <i>R. Br.</i>	<i>Chrysocalyx</i> <i>G & P</i>	<i>Scaligera</i> , <i>Ad.</i>	<i>Genistoides</i> , <i>Mön.</i>
<i>Poiretia</i> , <i>Smith.</i>	<i>Clavulium</i> , <i>Desv.</i>	<i>Buchenrödera</i> ,	<i>Genistella</i> , <i>Mön.</i>
<i>Physicarpus</i> , <i>Poir.</i>	<i>Mariantonia</i> , <i>Par</i>	[<i>E & Z.</i>	<i>Corothamnus</i> ,
<i>Plageolobium</i> , <i>Sw.</i>	<i>Protropis</i> , <i>W & A.</i>	<i>Anlacinthus</i> ,	[<i>Presl.</i>
<i>Lalage</i> , <i>Lindl.</i>	<i>Lupnius</i> , <i>S.</i>	[<i>E. M.</i>	<i>Corniola</i> , <i>Presl.</i>
? <i>Platyichilum</i> ,	<i>Xerocarpus</i> , <i>G. & P.</i>	<i>Sarcocalyx</i> , <i>Walp.</i>	<i>Voglera</i> , <i>Fl. Wett.</i>
[<i>Delavany.</i>	<i>Pentadynamis</i> , <i>R.Br.</i>	<i>Euchlora</i> , <i>E. & Z.</i>	<i>Salzwedelia</i> ,
<i>Platylobium</i> , <i>Sm.</i>	<i>Phyllocalyx</i> , <i>A.R.</i>	<i>Microtropis</i> , <i>E.M.</i>	[<i>Fl. W.</i>
<i>Cheilococca</i> , <i>Sal.</i>	<i>Westonia</i> , <i>Sp.</i>	<i>Mellolobium</i> , <i>E. & Z.</i>	<i>Dendrospartum</i> ,
<i>Bossiaea</i> , <i>Vent.</i>	<i>Rothia</i> , <i>Pers.</i>	<i>Sphingium</i> , <i>E. M.</i>	[<i>Spach.</i>
<i>Goodia</i> , <i>Sal.</i>	<i>Dillwynia</i> , <i>Roth.</i>	<i>Leptis</i> , <i>E. Meyer.</i>	<i>Retama</i> , <i>Boiss.</i>
<i>Templetonia</i> , <i>R. Br.</i>	<i>Harpelema</i> , <i>Jacq.</i>	<i>Lipozygis</i> , <i>E.M.p.</i>	<i>Syspone</i> , <i>Griesb.</i>
<i>Scottia</i> , <i>R. Br.</i>	<i>Götzeia</i> , <i>Reichb.</i>	<i>Leobordea</i> , <i>Delil.</i>	<i>Trychasma</i> , <i>Walp.</i>
<i>Rafnia</i> , <i>Th.</i>	<i>Loddigesia</i> , <i>Sims.</i>	<i>Copnitis</i> , <i>E. Mey.</i>	<i>Calycotome</i> , <i>Link.</i>
<i>Edmannia</i> , <i>Th.</i>	<i>Hypocalyptus</i> , <i>Th.</i>	<i>Krebsia</i> , <i>Eck & Zey</i>	<i>Gamochilum</i> , <i>Walp.</i>
<i>Vascoa</i> , <i>DC.</i>	<i>Lebeckia</i> , <i>Th.</i>	<i>Telina</i> , <i>E. Mey.</i>	<i>Argyrolobium</i> , <i>E. Z.</i>
<i>Pelecynthis</i> , <i>E.Mey.</i>	<i>Stiza</i> , <i>E. Mey.</i>	<i>Listia</i> , <i>E. Mey.</i>	<i>Chasmonia</i> , <i>E. M.</i>
<i>Borbonia</i> , <i>L.</i>	<i>Viborgia</i> , <i>Th.</i>	<i>Adenocarpus</i> , <i>DC.</i>	<i>Cytisus</i> , <i>L.</i>
<i>Achyronia</i> , <i>Wendl.</i>	<i>Acanthobotrya</i> ,	<i>Ononis</i> , <i>L.</i>	<i>Viborgia</i> , <i>Mön.</i>
<i>Liparia</i> , <i>L.</i>	[<i>E. & Z. in part.</i>	<i>Anonis</i> , <i>T.</i>	<i>Laburnum</i> , <i>Presl.</i>
<i>Priestleya</i> , <i>DC.</i>	<i>Acropodium</i> , <i>Dsv</i>	<i>Erinacea</i> , <i>Bois.</i>	<i>Chamaecytisus</i> ,
<i>Xiphotheca</i> ,	<i>Dichilus</i> , <i>DC.</i>	<i>Ulex</i> , <i>L.</i>	[<i>Link.</i>
[<i>E. & Z.</i>	<i>Colobotus</i> , <i>E. M.</i>	<i>Stauracanthus</i> <i>Link</i>	<i>Petteria</i> , <i>Presl.</i>
<i>Amphithalca</i> , <i>E & Z</i>	<i>Aspalathus</i> , <i>L.</i>	<i>Spartium</i> , <i>DC.</i>	<i>Calycotomon</i> ,
<i>Cryphantha</i> <i>E & Z</i>	<i>Eriocalyx</i> , <i>Neck.</i>	<i>Spartianthus</i> ,	[<i>Hoffms.</i>
<i>Ingenhousia</i> , <i>E.M</i>	<i>Pachyraphia</i> , <i>Pr.</i>	[<i>Link.</i>	<i>Podocytisus</i> , <i>Boiss.</i>
<i>Lathriogyne</i> , <i>E & Z.</i>	<i>Plagiostigma</i> , <i>Pr.</i>	<i>Sarcophyllum</i> , <i>Th.</i>	<i>Anthyllis</i> , <i>L.</i>
<i>Heudusa</i> , <i>E.M.</i>	<i>Streptosema</i> , <i>Pr.</i>	<i>Lembotropis</i> ,	<i>Pogonitis</i> , <i>Rehb.</i>
<i>Cedidium</i> , <i>Vogel.</i>	<i>Psilolepus</i> , <i>Pr.</i>	[<i>Griesb.</i>	<i>Cytisopsis</i> , <i>J. & S.</i>
<i>Epistemon</i> , <i>Walp.</i>	<i>Paraspilathus</i> ,	<i>Sarothamnus</i> , <i>Wim.</i>	<i>Physanthyllis</i> , <i>Boiss</i>
<i>Hallia</i> , <i>Th.</i>	[<i>Presl.</i>	<i>Spartium</i> , <i>Rehb.</i>	<i>Cornicina</i> , <i>Boiss.</i>
<i>Heylandia</i> , <i>DC.</i>	<i>Trincuria</i> , <i>Prsl.</i>	<i>Genista</i> , <i>Lam.</i>	<i>Hymenocarpus</i> <i>Savi</i>
<i>Requienia</i> , <i>DC.</i>	<i>Heterolathus</i> ,	<i>Spartium</i> , <i>L.</i>	<i>Meristotropis</i> , <i>F. & M</i>
<i>Crotalaria</i> , <i>L.</i>	[<i>Presl.</i>	<i>Scorpius</i> , <i>Mön.</i>	<i>Botryolotus</i> , <i>J. & S.</i>

SUB-TRIBE 2. TRIFOLIEÆ.—Stamens in two bundles—that is, nine joined together and one free. Stems herbaceous, rarely shrubby. Leaves usually palmate, with from three to five leaflets.

GENERA AND SYNONYMES.

<i>Medicago</i> , <i>L.</i>	<i>„ Galcarca</i> , <i>Pr.</i>	<i>Brachydontium</i> ,	<i>Bonjeania</i> , <i>Reich.</i>
<i>Lupularia</i> , <i>Ser.</i>	<i>Mistyllus</i> , <i>Pr.</i>	[<i>Reichb.</i>	<i>Hosackia</i> , <i>Dougl.</i>
<i>Spirocarpus</i> , <i>Ser.</i>	<i>Calycomorphum</i> ,	<i>Lotophyllum</i> ,	<i>Anisolotus</i> , <i>Brn.</i>
<i>Diploprium</i> , <i>Vis.</i>	[<i>Presl.</i>	[<i>Reichb.</i>	<i>Microlotus</i> , <i>Benth</i>
<i>Melissittis</i> , <i>Mon.</i>	<i>Lupinaster</i> , <i>Mon.</i>	<i>Amarenus</i> , <i>Pr.</i>	<i>Drepanolobus</i> , <i>Nt.</i>
<i>Trigonella</i> , <i>L.</i>	<i>Pentaphyllum</i> ,	<i>Paramesmus</i> , <i>Pr.</i>	<i>Symmatium</i> , <i>Vgl.</i>
<i>Pocockia</i> , <i>Ser.</i>	[<i>Pers.</i>	<i>Dorycnium</i> , <i>T.</i>	<i>Parochetus</i> , <i>Ham.</i>
<i>Melilotus</i> , <i>T.</i>	<i>Dactyphyllum</i> ,	<i>Dorycnopsis</i> , <i>Bois.</i>	<i>Podolotus</i> , <i>Benth.</i>
<i>Loxospermum</i> , <i>Hch</i>	[<i>Raf.</i>	<i>Lotus</i> , <i>L.</i>	<i>Melinospermum</i> ,
<i>Trifolium</i> , <i>T.</i>	<i>Amoria</i> , <i>Presl.</i>	<i>Tetragonolobus</i> ,	[<i>Walp.</i>
<i>Trichocephalum</i> ,	<i>Micranthemum</i> ,	[<i>Scop.</i>	<i>Calycotome</i> <i>E. M</i>
[<i>Koch.</i>	[<i>Presl.</i>	<i>Scandalida</i> , <i>Neck</i>	

SUB-TRIBE 3. GALEGEÆ.—Stamens in two bundles, rarely in one. Herbaceous plants, shrubs, or trees, with alternate or opposite leaves, which are usually unequally pinnate.

GENERA AND SYNONYMES.

Petalostemon, <i>L.C.</i>	Meladenia, <i>Turez.</i>	Xiphocarpus, <i>Frl</i>	Caragana, <i>Lam.</i>
[<i>R.</i>	Clidathera, <i>R. Br.</i>	Chadsia, <i>Boj.</i>	Chesneya, <i>Lindl.</i>
Kuhnistra, <i>Lam.</i>	Oxyranthis, <i>Wall.</i>	Crafordia, <i>Raf.</i>	Eriophaca, <i>Boiss.</i>
Cylipogon, <i>Raf.</i>	Glycyrrhiza, <i>T.</i>	Brongniartia, [<i>Knth.</i>	Ammothamnus <i>Bug.</i>
Dalen, <i>L.</i>	Liquiritia, <i>Mön.</i>	Peraltea, <i>Kunth.</i>	Peteria, <i>A. Gray.</i>
Parosella, <i>Cav.</i>	Meristotropis, <i>Fisch</i>	Lonchocarpus, <i>Kth</i>	Eversmannia, <i>Bug.</i>
Trichopodium, [<i>Prest.</i>	Galega, <i>T.</i>	Giricidia, <i>Kunth.</i>	Stracheya, <i>Bnth.</i>
Amorpha, <i>L.</i>	Cyclogyne, <i>Benth.</i>	Robinia, <i>L.</i>	Halimodendron, [<i>Fsch.</i>
Bonafidia, <i>Neck.</i>	Callotropis, <i>Don.</i>	Ileneea, <i>L. & O.</i>	Halodendron, <i>DC</i>
Eysenhardtia, <i>Kunth</i>	Aecorombona <i>End</i>	Poitava, <i>Vent.</i>	Calophaca, <i>Fisch.</i>
Psoralea, <i>L.</i>	Polytropia, <i>Prl</i>	Sabinea, <i>DC.</i>	Colutea, <i>L.</i>
Dorychnium, <i>Mön</i>	Chaetocalyx, <i>DC.</i>	Coursetia, <i>DC.</i>	Eremosparton, <i>Fsch</i>
Ruteria, <i>Mön.</i>	Bönnighausia <i>Sp</i>	Cracca, <i>Benth.</i>	Swainsonia, <i>Sal.</i>
Poikadenia, <i>Ell.</i>	Apodynomene, <i>E.M</i>	Glottidium, <i>Desv.</i>	Lessertia, <i>DC.</i>
Ototropis, <i>Benth.</i>	Pogonostigma <i>Boiss</i>	Sesbania, <i>Pers.</i>	Sulitra, <i>Mön.</i>
Oustropis, <i>Don.</i>	Catacline, <i>Edg.</i>	Sesban, <i>Poir.</i>	Phyllobium, <i>Fsch</i>
Pycnospora, <i>R. Br.</i>	Tephrosia, <i>Pers.</i>	Emerus, <i>Schum.</i>	Sylitra, <i>E. Meyer.</i>
Indigofera, <i>L.</i>	Cracca, <i>L.</i>	Herminiera, <i>G. & P.</i>	Sutherlandia, <i>R.Br.</i>
Sphæridiophor- [<i>uni, Desv.</i>	Needhamia, <i>Scop</i>	Agati, <i>Rheed.</i>	Colutia, <i>Mön.</i>
Hemispadon <i>Endl</i>	Reineria, <i>Mön.</i>	Daubentonina, <i>DC.</i>	Ptychocoma, <i>Bnth.</i>
Diplonyx, <i>Raf.</i>	Kiesera, <i>Reino.</i>	Diphysa, <i>Jacq.</i>	Clianthus, <i>Sol.</i>
Eilemanthus, <i>Hest.</i>	Brissonia, <i>Neck.</i>	Coryniella, <i>DC.</i>	Streblorhiza, <i>End</i>
	Maeronyx, <i>Dalz.</i>	Corynitis, <i>Sp.</i>	Carmichaelia, <i>R.Br.</i>
	Erebinthus, <i>Mch</i>		

SUB-TRIBE 4. ASTRALAGEÆ.—Pod two-celled or half two-celled from one of the sutures being bent inwards lengthwise, Fig. B. Stamens in two bundles, nine joined and one free. Stems herbaceous or shrubby. Leaves unequally pinnate.

GENERA AND SYNONYMES.

Sphærophysa, <i>DC.</i>	Spiesia, <i>Neck.</i>	Pelecinus, <i>T.</i>
Güldenstedtia, <i>Fisch.</i>	Astragalus, <i>DC.</i>	Homalobus, <i>Nutt.</i>
Phaca, <i>L.</i>	Diplothea, <i>Hochst.</i>	Kentrophyta, <i>Nutt.</i>
Oxytropis, <i>DC.</i>	Bisserula, <i>L.</i>	Herpalyce, <i>Moç. & Sess.</i>

TRIBE 3. VICIÆ.—Corolla papilionaceous. Stamens ten, in two bundles—that is, nine joined together and one free. Pod two-valved, continuous, Fig. A. Seed-lobes of the embryo meally, not changing in germination, but remaining enclosed in the seed-skin.

GENERA AND SYNONYMES.

Cicer, <i>T.</i>	Faba, <i>T.</i>	„ Aphaca, <i>T.</i>	Cicerella, <i>Mön.</i>
Pisum, <i>T.</i>	Wiggersia, <i>Fl. W</i>	Ochrus, <i>T.</i>	Anurus, <i>E.M.</i>
Ervum, <i>L.</i>	Oxypogon, <i>Raf.</i>	Clymenum, <i>T.</i>	Orobis, <i>T.</i>
Coppolaria, <i>Todar</i>	Lathyrus, <i>L.</i>	Nissolia, <i>T.</i>	Plasystylis, <i>Sweet</i>
Vicia, <i>L.</i>			

TRIBE 4. HEDYSARÆ.—Corolla papilionaceous. Stamens ten, in one or two bundles, nine joined and one free, or five in each bundle. Pod divided transversely into one-seeded joints or cells, Fig. E. Seed-lobes of the embryo leafy; radicle incurved. Leaves either simple, trifoliate, or unequally pinnate, and often with small leaflets at the base of wings.

SUB-TRIBE 1. CORONILLEÆ.—Flowers in umbels. Pod either round and long or compressed. Stamens, nine united and one free.

GENERA AND SYNONYMES.

Scorpiurus, <i>L.</i>	Arthrolobium, <i>Dav</i>	Ornithopodium <i>T</i>	Bonaveria, <i>Scop.</i>
Scorpioides, <i>T.</i>	Astrolobium, <i>DC</i>	Hippocrepis, <i>L.</i>	Securigera, <i>DC.</i>
Scorpius, <i>Lour.</i>	Hammatolobium,	Helmiutnocarpus,	Securilla, <i>Pers.</i>
Coronilla, <i>L.</i>	[<i>Fenzl.</i>	[<i>A. Rich.</i>	Securidaca, <i>T.</i>
Antopetitia, <i>Rich.</i>	Ornithopus, <i>L.</i>		

SUB-TRIBE 2. HEDYSARÆÆ.—Flowers disposed in racemes. Pods compressed.

GENERA AND SYNONYMES.

Diphaca, <i>Lour.</i>	Arachidnoides,	Kotschya, <i>Endl.</i>	Phyllodium, <i>Desv.</i>
Pictelia, <i>DC.</i>	[<i>Niss.</i>	Smithia, <i>Ait.</i>	Pteroloma, <i>Desv.</i>
Brya, <i>P. Br.</i>	Chamæbalauus,	Petagnana, <i>Gml.</i>	Catenaria, <i>Benth.</i>
Grimocarpum, <i>Palis</i>	[<i>Rumph.</i>	Lourea, <i>Neek.</i>	Cyclomorium, <i>Walp</i>
Acrotaphros, <i>A. R.</i>	Mundubi, <i>Mareg.</i>	Christia, <i>Mön.</i>	Dicerma, <i>DC.</i>
Amicia, <i>Kunth.</i>	Chapmannia, <i>T. & G</i>	Uraria, <i>Desv.</i>	Eversmanuia, <i>Bng.</i>
Zygoteris, <i>Fl. M</i>	Adesmia, <i>DC.</i>	Doodia, <i>Roxb.</i>	Taverniera, <i>DC.</i>
Poiretia, <i>Vent.</i>	Patagonium,	Mecopus, <i>Benn.</i>	Hedysarum, <i>L.</i>
Turpinia, <i>Pers.</i>	[<i>Schrank.</i>	Nicolsonia, <i>DC.</i>	Echiulobium
Myriadenus, <i>Desv.</i>	Heteroloma, <i>Desv</i>	Perrottetia, <i>DC.</i>	[<i>Desv.</i>
Planaria, <i>Desv.</i>	Loudonia, <i>Bert</i>	Anarthrosyne, <i>E. M</i>	Onobrychis, <i>T.</i>
Geissaspis, <i>W. & A.</i>	Rathkea, <i>Schum.</i>	Dollinera, <i>Endl.</i>	Eriocarpæa, <i>Bert</i>
Phylacium, <i>Benn.</i>	Æschynomene, <i>L.</i>	Ototropis, <i>Schau.</i>	Eleiotis, <i>DC.</i>
Zornia, <i>Gmel.</i>	Isodesmia, <i>Gard.</i>	Desmodium, <i>DC.</i>	Oxydium, <i>Benn.</i>
Stylosanthes, <i>L.</i>	Macromiscus, <i>Trez.</i>	Dendrolobium, <i>W.</i>	Campylotropis, <i>Bng</i>
Arachis, <i>L.</i>	Ruppelia, <i>A. Rich.</i>	[<i>& A.</i>	Lespedeza, <i>L. C. R.</i>
Arachidna, <i>Pl.</i>	Sömmeringia, <i>Mrt.</i>	Ongeinia, <i>Benth.</i>	Ebenus, <i>L.</i>

SUB-TRIBE 3. ALHAGEÆÆ.—Flowers disposed in racemes or spikes. Pods nearly cylindrical.

GENERA AND SYNONYMES.

Alhagi, <i>T.</i>	Hallia, <i>Jeaurm.</i>	Rhadinocarpus, <i>Vog</i>
Manna, <i>Don.</i>	Fabricia, <i>Scop.</i>	Nissolia, <i>Jacq.</i>
Alysicarpus, <i>Neek.</i>	Bremontiera, <i>DC.</i>	Nissoliaria, <i>DC.</i>

TRIBE 5. Phaseolææ.—Corolla papilionaceous. Stamens ten, united in two bundles, rarely in one. Pod two-valved continuous, many-seeded, with a cellular transverse membrane between each seed, divided into compartments by slight ridges, but never articulated or separating into points, Fig. D. Embryo with fleshy seed-lobes, not changing by germination, but grow into thick leaves, and when above the soil they are usually pretruded beyond the seed-skin; radicle incurved. Leaves pinnately trifoliate, rarely palmately disposed,

SUB-TRIBE 1. CLITORIÆÆ.

GENERA AND SYNONYMES.

Amphicarpæa, <i>Ell.</i>	Pueraria, <i>DC.</i>	Neurocarpum, <i>Desv</i>	Pilanthus, <i>Poit.</i>
Savia, <i>Raf.</i>	Colozania, <i>Kunth.</i>	Rhombilofolium,	Centrosema, <i>DC.</i>
Xypherus, <i>Raf.</i>	Clitoria, <i>L.</i>	[<i>Rich.</i>	Steganotropis,
Cryptolobus, <i>Sp.</i>	Clitorius, <i>Petiv.</i>	Martia, <i>Leandr.</i>	[<i>Lehm.</i>
Falcata, <i>Gmel.</i>	Nauchea, <i>Descou</i>	Martusia, <i>Schlt.</i>	Periandra, <i>Mart.</i>
Dumasia, <i>DC.</i>	Ternatea, <i>T.</i>	Vexillaria, <i>Benth.</i>	Platysema, <i>Benth.</i>

SUB-TRIBE 2. KENNEDYÆ.

GENERA AND SYNONYMS.

Kennedyia, <i>Vent.</i>	Amphodus, <i>Lindl.</i>	Physolobium, <i>Benth.</i>	Leptocyamus, <i>Bnt.</i>
Caulinia, <i>Mön.</i>	Zichya, <i>Hügel</i>	Hardenbergia, <i>Bnth.</i>	Leptolobium, <i>Bnt.</i>

SUB-TRIBE 3. GLYCINEÆ.

GENERA AND SYNONYMS.

Johnia, <i>W. & A.</i>	Soja, <i>Mönch.</i>	Galactia, <i>P. Br.</i>	Heterocarpæa,
Notonia, <i>W. & A.</i>	Glycine, <i>L.</i>	Bradburya, <i>Raf.</i>	[<i>Schreb.</i>
Cyamopsis, <i>DC.</i>	Bujacia, <i>E. M.</i>	Sweetia, <i>DC.</i>	Leucodictyon, <i>Dalz.</i>
Cordia, <i>Sp.</i>	Teramnus, <i>P. Br.</i>	Odonia, <i>Bertol.</i>	Kiesera, <i>Reinv.</i>
Stenolobium, <i>Bnt.</i>	Betencourtia, <i>St. H.</i>	Grona, <i>Lour.</i>	Vilmorinia, <i>DC.</i>
Cyanostemma,	Shunteria, <i>W. & A.</i>		Barbieria, <i>DC.</i>
[<i>Bnt.</i>			

SUB-TRIBE 4. DIOCLEÆ.

GENERA AND SYNONYMS.

Collaea, <i>DC.</i>	Cratylia, <i>Mart.</i>	Canavalia, <i>DC.</i>	Wenderothia,
Neustanthus, <i>Bnth.</i>	Dioclea, <i>Kunth.</i>	Malocchia, <i>Savi.</i>	[<i>Schleid.</i>
Bionia, <i>Mart.</i>	Hymenospron, <i>Sp.</i>	Canavali, <i>Ad.</i>	Nattamame, <i>Bnks.</i>
Camptosema, <i>H. & A.</i>	Crepidotropis, <i>Walp.</i>	Clomentea, <i>Cav.</i>	Chloryllis, <i>E. Mey.</i>
Cleobulia, <i>Mart.</i>	Cymbosema, <i>Benth.</i>	Monodon, <i>E. M.</i>	

SUB-TRIBE 5. ERYTHRINEÆ.

GENERA AND SYNONYMS.

Mucuna, <i>Ad.</i>	Macroceratides,	Mouricou, <i>Ad.</i>	Strongylodon, <i>Vog.</i>
Stizolobium, <i>Pers.</i>	[<i>Radd.</i>	Chirocalyx, <i>Meisn.</i>	Rudolophia, <i>W.</i>
Honera, <i>Neck.</i>	Pillera, <i>Endl.</i>	Micropterix, <i>Walp.</i>	Butea, <i>König.</i>
Negretia, <i>R. & P.</i>	Citta, <i>Lour.</i>	Duchassainya, <i>Walp.</i>	Plaso, <i>Rheed.</i>
Labradia, <i>Swed.</i>	Erythrina, <i>L.</i>	Robynsia, <i>Martens.</i>	Spatholobus, <i>Hsk.</i>
Carpopogon, <i>Rox.</i>	Corallodendron, <i>T.</i>	Mintclersia, <i>Mrtns.</i>	Drebbelia, <i>Zoll.</i>

SUB-TRIBE 6. WISTERIEÆ.

GENERA AND SYNONYMS.

Wisteria, <i>Nutt.</i>	Cyrtotropis, <i>Wall.</i>
Thyrsanthus, <i>Ell.</i>	Apios, <i>Boerh.</i>
Kraunhia, <i>Raf.</i>	

SUB-TRIBE 7. EUPHIASEOLEÆ.

GENERA AND SYNONYMS.

Phaseolus, <i>L.</i>	Otoptera, <i>DC.</i>	Sphenostyles, <i>E. M.</i>	Diesingia, <i>Endl.</i>
Strophostylis, <i>Ell.</i>	Plectrotropis, <i>Schm.</i>	Pachyrrhizus, <i>Rich.</i>	Dunbaria, <i>W. & A.</i>
Vigna, <i>Savi.</i>	Dolichos, <i>L.</i>	Cacara, <i>Thou.</i>	Tæniocarpum, <i>Dsv.</i>
Scytalis, <i>E. Mey.</i>	Lablab, <i>Ad.</i>	Psophocarpus, <i>Nek.</i>	Voandzeia, <i>Thou.</i>
Callicystus, <i>Endl.</i>	Dolichos, <i>Gært.</i>	Eotor, <i>Ad.</i>	Voandzou, <i>Flac.</i>

SUB-TRIBE 8. CAJANEÆ.

GENERA AND SYNONYMS.

Fagelia, <i>Neck.</i>	Cajan, <i>Ad.</i>	Cantharospium, <i>W. & Arn.</i>
Cajanus, <i>DC.</i>	Atylosia, <i>W. & Arn.</i>	Pseudarthria, <i>W. & A.</i>

SUB-TRIBE 9. RHYNCHOSIEÆ.

GENERA AND SYNONYMS.

Orthodanum <i>E. Mey</i>	Rynchosia, <i>DC.</i>	Cylista, <i>Ait.</i>	Ostryodum, <i>Dsv</i>
Eriosema, <i>DC.</i>	Copisma, <i>E. Mey.</i>	Cyanospermum, <i>W.</i>	Lourea, <i>Jeaum.</i>
Euriosma, <i>Desv.</i>	Glycine, <i>Nutt.</i>	[<i>& A.</i>]	Moghania, <i>Jeaum</i>
Pyrrhotrichia, <i>W</i>	Arephyllum, <i>Ell</i>	Chrysoscias, <i>E. Mey</i>	Lepidocoma, <i>Jng.</i>
[<i>& A.</i>]	Pitcheria, <i>Nutt.</i>	Flemingia, <i>Roxb</i>	Pycnospora, <i>R. Br.</i>
Hidrosia, <i>E. Mey.</i>	Nomisnia, <i>W. & A.</i>	Millingtonia, <i>Rx.</i>	

SUB-TRIBE 10. ABRINEÆ.

GENERA.

Abrus, *L.*

DOUBTFUL.

Macranthus, *Lour.* | Calopogonium, *Desv.* | Cruminium, *Desv.*

TRIBE 6. Dalbergiæ.—Corolla papilionaceous. Stamens ten, united either in one or two bundles. Pod unopening, often divided into cells by internal ridges. Embryo with fleshy seed-lobes, with a curved or straight radicle. Climbing shrubs with pinnated, rarely trifoliate leaves.

GENERA AND SYNONYMS.

Cyclolobium, <i>Benth.</i>	Drepanocarpus <i>C. M.</i>	Endespermum, <i>Bl.</i>	Cylizoma, <i>Neck.</i>
Amerimnum, <i>P. Br.</i>	Nephrosis, <i>Rich.</i>	Dalbergia, <i>L.</i>	Müllera, <i>L. f.</i>
Corytholobium, [<i>Benth.</i>]	Sommerfeldtia, [<i>Schum.</i>]	Solori, <i>Ad.</i>	Coublandia, <i>Aub.</i>
Heecastophyllum, [<i>Kunth.</i>]	Oruearia, <i>Chus.</i>	Trioptolomia, <i>Mrt.</i>	Andira, <i>Lam.</i>
Ecastophyllum, [<i>P. Br.</i>]	Machærium, <i>Pers.</i>	Semeonotis, <i>Schott.</i>	Vouacapoua, <i>Aub</i>
Acouroa, <i>Aub.</i>	Nissolia, <i>DC.</i>	Miscolobium, <i>Vog.</i>	Euchresta, <i>Benn.</i>
Drakensteiniia <i>Nk</i>	Gomezium, <i>DC.</i>	Platymiscium, <i>Vog.</i>	Crepidotropis, <i>Wlp</i>
Moutouchia, <i>Aub</i>	Attaleia, <i>M. & S.</i>	Platypodium, <i>Vog.</i>	Dipterix, <i>Schreb.</i>
Grieselinia, <i>Nk.</i>	Brachypterum, <i>W.</i>	Calli-emæa, <i>Bnt.</i>	Coumarouna, <i>Aub</i>
Pterocarpus, <i>L.</i>	[<i>& A.</i>]	Discolobium, <i>Bnt.</i>	Baryosma, <i>Gært.</i>
Santalaria, <i>DC.</i>	Pongamia, <i>Lam.</i>	Piscidia, <i>L.</i>	Heinzia, <i>Scop.</i>
Echinodiscus, <i>Bnt.</i>	Galedupa, <i>Lam.</i>	Piscipula, <i>Loff.</i>	Taralea, <i>Aub.</i>
Weinreichia, <i>Bnt</i>	Sphinctolobium <i>Vog</i>	Ichthyomethia, [<i>P. Br.</i>]	Boldueia, <i>Neck.</i>
Amphymenium, [<i>Kunth.</i>]	Milletia, <i>W. & Arn.</i>	Phellocarpus, <i>Bnt.</i>	Commilobium, <i>Benth</i>
Apalatoa, <i>Aub.</i>	Mundulca, <i>Benth.</i>	Geoffroya, <i>Jacq.</i>	Pterodon, <i>Vog.</i>
	Otosema, <i>Benth.</i>	Umari, <i>Mareg.</i>	Apoplanesia, <i>Bl.</i>
	Fornarina, <i>Bert.</i>	Deguelia, <i>Aub.</i>	Derris, <i>Lour.</i>
	Ostryocarpus <i>Hook f</i>		Vatairea, <i>Aub.</i>

TRIBE 7. Saphoræ.—Corolla papilionaceous. Stamens ten, rarely eight or nine, free. Pod continuous, unarticulate, either unopening, or two-valved, Fig. C. Embryo with either thick or leafy seed-lobes, and a straight or curved radicle. Leaves unequally pinnate or simple.

GENERA AND SYNONYMS.

Myrospermum <i>Jacq</i>	Virgilia, <i>L.</i>	Ormosia, <i>Jacks.</i>	Callerya, <i>Endl.</i>
Toluifera, <i>L.</i>	Cladrastia, <i>Raf.</i>	Toulchiba, <i>Ad.</i>	Marquartia, <i>Vog.</i>
Edwardsia, <i>Sal.</i>	Styphnolobium, [<i>Schott.</i>]	Dibrachion, <i>Tul.</i>	Cerei, <i>L.</i>
Sophora, <i>L.</i>	Macrotripis, <i>DC.</i>	Alexandrina, [<i>Schomb.</i>]	Siliquastrum, <i>T.</i>
Broussonetia, <i>Bl.</i>	Laya, <i>H. & Arn.</i>	Diptotropis, <i>Buth.</i>	Dalhousica, <i>Wall.</i>
Radiusia, <i>Reich.</i>	Castanospermum, [<i>A. Cunn.</i>]	Bowdichia, <i>Knth.</i>	Delaria, <i>Desv.</i>
Ammodendron, [<i>Fisch.</i>]	Gourlica, <i>Gill.</i>	Sebipira, <i>Mart.</i>	Bracteolaria, <i>Hochst</i>
Calpurnia, <i>E. Mey.</i>		Spirotropis, <i>Tul.</i>	Leucomphalus, <i>Bnt</i>
			Bowringia, <i>Champ.</i>

TRIBE 8. *Cæsalpinieæ*.—Corolla irregular, sub-papilionaceous, or almost regular, sometimes wanting. Stamens ten or fewer, free, or occasionally united. Pod usually dry and two-valved, sometimes divided transversely into one-seeded cells, Fig. F. Embryo straight, with leafy, rarely fleshy, seed-lobes. Leaves unequally or abruptly pinnate, sometimes simple.

GENERA AND SYNONYMES.

Leptolobium, <i>Vog.</i>	Cinclidocarpus, <i>Zoll</i>	Cynomorium,	Eperua, <i>Aubl.</i>
Tachigalia, <i>Aub.</i>	Wagatea, <i>Dalz.</i>	[<i>Rmph.</i>	Rotmannia, <i>Neck</i>
Valentynia, <i>Nck.</i>	Cladotrichium, <i>Vog</i>	Schotia, <i>Jacq.</i>	Panzera, <i>W.</i>
Tachia, <i>Pers.</i>	Pomaria, <i>Cav.</i>	Scotia, <i>Th.</i>	Campsiandra, <i>Bnth</i>
Tassia, <i>Rich.</i>	Burkia, <i>Benth.</i>	Theodoria, <i>Med.</i>	Parivoa, <i>Aubl.</i>
Acosmium, <i>Schott.</i>	Melanosticta, <i>DC.</i>	Omphalobium,	Adleria, <i>Neck.</i>
Sweetia, <i>Sp.</i>	Zuccagnia, <i>Cav.</i>	[<i>Jacq. f.</i>	Dimorpha, <i>W.</i>
Mora, <i>Benth.</i>	Hoffmanseggia, <i>Cav</i>	Alöexylon, <i>Lour.</i>	Crudia, <i>W.</i>
Sclerolobium, <i>Vog.</i>	Parkinsonia, <i>Pl.</i>	Peltogyne, <i>Vog.</i>	Crudea, <i>Schreb.</i>
Gleditschia, <i>L.</i>	Cadia, <i>Forsk.</i>	Trachylobium, <i>Hyn</i>	Touchiroua, <i>Aub.</i>
Gymnocladus, <i>Lam</i>	Sphaedoncea,	Hymenæa, <i>L.</i>	Apalatoa, <i>Aub.</i>
Exostylis, <i>Schott.</i>	[<i>Desf.</i>	Courbaril, <i>Pl.</i>	Waldschmidtia,
Apuleja, <i>Mart.</i>	Panciatica, <i>Pic.</i>	Caulotretus, <i>Rich.</i>	[<i>Neck.</i>
Schizolobium, <i>Vog.</i>	Hæmatoxylon, <i>L.</i>	Bauhinia, <i>Kuth.</i>	Vouarana, <i>Aub.</i>
Melanoxylon, <i>Schott</i>	Tamarindus, <i>T.</i>	Schnella, <i>Radd.</i>	Pterogyne, <i>Tul.</i>
Pöppigia, <i>Presl.</i>	Phyllocarpus, <i>Tul.</i>	Bauhinia, <i>Pl.</i>	Zenkeria, <i>Arn.</i>
Diptychandra, <i>Tul.</i>	Anoma, <i>Lour.</i>	Pauletia, <i>Cav.</i>	Macrolobium, <i>Schröb</i>
Cenostigma, <i>Tul.</i>	Moldenhauera	Phanera, <i>Lour.</i>	Kreugeria, <i>Neck.</i>
Cercidium, <i>Tul.</i>	[<i>Schrad.</i>	Piliostigma, <i>Hbst.</i>	Vouapa, <i>Aubl.</i>
Guilandina, <i>Juss.</i>	Dolichonema	Parlebia, <i>Mart.</i>	Outea, <i>Aubl.</i>
Bondue, <i>Pl.</i>	[<i>Nees.</i>	Amaria, <i>Mut.</i>	Codarium, <i>Sol.</i>
Coulteria, <i>Kunth.</i>	Cassia, <i>L.</i>	Etaballia, <i>Benth.</i>	Dialium, <i>Burm.</i>
Adenocalyx, <i>Bert</i>	Cathartocarpus,	Casparca, <i>Kunth.</i>	Arouna, <i>Aub.</i>
Tara, <i>Motin.</i>	[<i>Pers</i>	Bauhinia, <i>Cav.</i>	Cleyria, <i>Neck.</i>
Cæsalpinia, <i>Pl.</i>	Bactrylobium, <i>W</i>	Humboldtia, <i>Vahl.</i>	Copaifera, <i>L.</i>
Tikanto, <i>Ad.</i>	Baryxylon, <i>Lour</i>	Batschia, <i>Vahl.</i>	Copaiva, <i>Jacq.</i>
Campecia, <i>Ad.</i>	Chamæcassia,	Amherstia, <i>Wall.</i>	Coapoiba, <i>Marçg</i>
Erythrostemon, <i>Lk</i>	[<i>Brcyn.</i>	Heterostemon, <i>Desf</i>	Riveria, <i>Kunth.</i>
Peltophorum, <i>Vog.</i>	Chamæfistula, <i>G.</i>	Jonesia, <i>Rozb.</i>	Hardwickia, <i>Roz.</i>
Brasilettia, <i>DC.</i>	[<i>Don.</i>	Saraca, <i>Burm.</i>	Ceratonia, <i>L.</i>
Poinciana, <i>L.</i>	Chamæcrista, <i>EM</i>	Afzelia, <i>Smith.</i>	Siliqua, <i>T.</i>
Poincia, <i>Neck.</i>	Grimaldia, <i>Schröb</i>	Pancovia, <i>W.</i>	Aerocarpus, <i>Arn.</i>
Colvillea, <i>Boj.</i>	Senna, <i>T.</i>	Anthionota, <i>Palis.</i>	Brownea, <i>Jacq.</i>
Mezoneuron, <i>Desf.</i>	Labichea, <i>Gaud.</i>	Westia, <i>Vahl.</i>	Hermesias, <i>Löff.</i>
Pterolobium, <i>R. Br</i>	Dicornea, <i>Benth.</i>	Intsia, <i>Thouars.</i>	Elizabetha, <i>Schom.</i>
Quartinia, <i>Aub.</i>	Petalostylis, <i>R. Br.</i>	Palovea, <i>Aubl.</i>	Thylacanthus, <i>Tul.</i>
Reichardia, <i>Roth</i>	Metrocynia, <i>Thou.</i>	Ginnania, <i>Scop.</i>	Balsamocarpus, <i>Clos</i>
Kantuffa, <i>Bruee.</i>	Cynometra, <i>L.</i>		

TRIBE 9. *Moringeæ*.—Corolla irregular. Stamens eight or ten, inserted in the top of the disk which lines the base of the calyx, free at the base, but connate at the middle. Pod, with three valves, one-celled, lined with a fungous substance in which the seeds are imbedded. Embryo with fleshy seed-lobes, a very short superior radicle and a many-leaved plumule.

GENERA AND SYNONYMES.

Moringa, *Burm.*
Hyperanthera, *Forsk.*
Anoma, *Lour*

„ Hypelate, *Smith*
Alandina, *Neck.*
Balanus, *Endl.*

TRIBE 10. *Swartzieæ*.—Flowers perfect, somewhat irregular. Petals and stamens hypogynous. Stamens rarely inserted in the calyx, either nine or ten, or indefinite in number, free, some smaller than the others, and sterile. Pod two-valved, or drupaceous, unopening. Embryo without albumen; seed-lobes thick; radicle incurved. Leaves simple, or simply pinnate.

SUB-TRIBE 1. *SWARTZIEÆ VERÆ*.—Pod two-valved.

GENERA AND SYNONYMES.

<i>Baphia</i> , <i>Afz.</i>	<i>Riveria</i> , <i>H. B. K.</i>	<i>Rittera</i> , <i>Schreb.</i>
<i>Zollernia</i> , <i>Mart.</i>	<i>Touanatea</i> , <i>Aub.</i>	<i>Hæzelia</i> , <i>Neck.</i>
<i>Acidandra</i> , <i>Mart.</i>	<i>Gynanthistrophe</i> , <i>Poit.</i>	<i>Aldina</i> , <i>Endl.</i>
<i>Coquebertia</i> , <i>Brongn.</i>	<i>Possira</i> , <i>Aub.</i>	<i>Allania</i> , <i>Benth.</i>
<i>Swartzia</i> , <i>N.</i>		

SUB-TRIBE 2. *DETARIEÆ*.—Pod drupaceous, unopening.

GENERA AND SYNONYMES.

Detarium, *Juss.* | *Cordyla*, *Lour.* | „ *Cordylia*, *Pers.* | „ *Calycandra*, *A. Rich.*

TRIBE 11. *Mimoseæ*.—Flowers regular, generally unisexual, sometimes hermaphrodite. Calyx with four or five equal lobes valvate, or rarely imbricate in æstivation. Petals, from four to five equal, inserted in the receptacle, and valvate in æstivation. Stamens inserted with the petals, rarely in the bottom of the calyx, sometimes free and sometimes connected at the base, equal in number to the petals or a multiple of their number. Embryo straight, with large thick seed-lobes; a short straight radicle, and an inconspicuous plumule.

SUB-TRIBE 1. *PARKIEÆ*.

GENERA.

<i>Erythrophloeum</i> , <i>Afz.</i>	<i>Parkia</i> , <i>R. Br.</i>
<i>Filix</i> , <i>Guill.</i>	<i>Pentaclethera</i> , <i>Benth.</i>

SUB-TRIBE 2. *ACACIEÆ*.

GENERA AND SYNONYMES.

<i>Adenanthera</i> , <i>L.</i>	<i>Leptoglottis</i> , <i>DC.</i>	<i>Plathymenea</i> , <i>Bnt.</i>	<i>Vachelia</i> , <i>W. & A.</i>
<i>Clypearia</i> , <i>Rmph.</i>	<i>Desmanthus</i> , <i>W.</i>	<i>Stryphnodendron</i> ,	<i>Farnesia</i> , <i>Gasp.</i>
<i>Prosopis</i> , <i>L.</i>	<i>Neptuni</i> , <i>Lour.</i>	[<i>Mart.</i>	<i>Zygia</i> , <i>P. Br.</i>
<i>Lagonychium</i> , <i>Bieb.</i>	<i>Schrankia</i> , <i>W.</i>	<i>Elephantorrhiza</i> ,	<i>Cuiliandra</i> , <i>Bnth.</i>
<i>Algarobia</i> , <i>Benth.</i>	<i>Lucena</i> , <i>Benth.</i>	[<i>Benth.</i>	<i>Pithecolobium</i> , <i>Mrt</i>
<i>Prosopis</i> , <i>Kuth.</i>	<i>Xylia</i> , <i>Benth.</i>	<i>Tetrapleura</i> , <i>Bnt.</i>	<i>Enterolobium</i> , <i>Mart</i>
<i>Dimorphandra</i> ,	<i>Darlingtonia</i> , <i>DC.</i>	<i>Gagnebina</i> , <i>Neck.</i>	<i>Serianthes</i> , <i>Benth.</i>
[<i>Schott.</i>	<i>Mimosa</i> , <i>Ad.</i>	<i>Acacia</i> , <i>Neck.</i>	<i>Inga</i> , <i>Pl.</i>
<i>Caillica</i> , <i>Guill.</i>	<i>Entada</i> , <i>Ad.</i>	<i>Lysiloma</i> , <i>Benth.</i>	<i>Amosa</i> , <i>Neck.</i>
<i>Dichrostachys</i> ,	<i>Gigalobium</i> , <i>P Br</i>	<i>Atbizzia</i> , <i>Euraz.</i>	<i>Affonsea</i> , <i>St. Hel.</i>
[<i>W. & A.</i>	<i>Pursætha</i> , <i>L.</i>		

GEOGRAPHICAL DISTRIBUTION.—This, one of the most extensive families in the vegetable kingdom, is distributed over the whole known world. The greatest number is found between the tropics, and they gradually diminish

towards the poles, but they are more numerous towards the north than towards the south. In the islands of St. Helena and Tristan d'Acugna they are unknown.

PROPERTIES AND USES.—The properties and uses of the Pod-Bearers are exceedingly various. Many of them are well known in domestic and rural economy; many are employed in medicine and in the arts, and some are even poisonous. Among them we find those that yield nutritive matters, as the Pea, the Bean, the Haricot, and the Lentil; and some of the most common forage plants, as Clover, Sainfoin, Lucern, and Trefoil. Of those possessing medicinal properties, some are purgative, as several species of Cassia; tonic and astringent, as *Acacia catechu*; resins and balsams, as are the products of *Myroxylum*, *Hymenæa*, and *Copaifera*; or aromatic and excitant, as several species of *Melilotus*, the Tonka Bean, and many others. Some yield saccharine matters, as the Liquorice-root; others contain valuable colouring matter, as Indigo and Logwood; while in *Cesalpinia* we meet not only with the dyeing qualities of Brazil wood and Sappan, but with the tanning properties of *Divi-divi*. Oils are also to be found, and from *Moringa* the Oil of Ben is obtained. The well-known Gum Arabic and Gum Senegal are the produce of some species of *acacia*, and other genera furnish the gums kino, tragacanth, and several others. The gay Laburnum and some others are narcotic poisons. But we shall not further particularize, but proceed at once to the consideration of each tribe in their order.

Podalyriæ.—Following the order of arrangement, the first subject we come to, which is known to possess any properties, is *Baptisia tinctoria*, called in America *Wild Indigo*, and it is used both as a medicine and for dyeing. It is a bush, three feet high, inhabiting the United States, and the bark of its roots is of a nauseous, somewhat acrid, taste, and when taken in large doses is violently cathartic and emetic, but in smaller it acts as a mild laxative. A decoction of an ounce to a pint of water, and taken in doses of half a fluid ounce, every four or eight hours, has been found useful in scarlatina and typhus fever; and both as an internal and external remedy it has been very beneficial in threatened or existing mortification. The stem and the leaves possess the same properties as the root, but in a less degree. A pale blue colouring matter has been prepared from the plant, and employed as a substitute for indigo, but it is much inferior. The remaining portion of this tribe, almost all of which are natives of Australia, with the exception of a few which are found at the Cape of Good Hope, are not known to yield any products, or to be applied to any particular uses.

Loteæ.—The fibrous substance called *Sunn*, *Madras Hemp*, *Bombay Hemp*, *Brown Hemp*, in India, and which is there used so extensively as a substitute for true hemp, is the produce of *Crotalaria juncea*. It makes excellent cordage and sacking, and is extensively used all over India for these purposes. Some specimens of the Brown Hemp have been found to equal that of the best St. Petersburg. It is an annual plant, and grows from four to eight or ten feet high. The seed is generally sown in May or June, and when the plant has acquired its full growth, which is during August, it is pulled and steeped for three or four days, according to the heat of the weather, to separate the fibre; and, after being washed, it is

hung up on bamboos or lines to dry. The produce is from three to ten hundredweight per acre. *Jubbulpore Hemp* is yielded by *C. tenuifolia*, and is equal, if not superior, in strength to that of St. Petersburg. This is a perennial plant, and grows nine feet high. Some of the *Lupines*, which were so extensively cultivated by the ancient Romans, both as forage plants for cattle, and as pulse for human food, are still employed for the same purposes in some parts of Italy. The White Lupine (*Lupinus albus*) is so grown, and in Tuscany it is cultivated as an ameliorating crop, to be ploughed in where no manure is to be had. The seeds have a strong, disagreeable, and bitter taste, and are said to be anthelmintic; but they lose the unpleasant taste by boiling. *Ononis arvensis*, so common by waysides, and in corn-fields in this country, and called *Rest Harrow* or *Cammoek*, is, when tender, and before it has become woody, much relished by sheep, and a decoction of the whole plant has been much recommended as a remedy for horses suffering under a suppression of urine.

The beautiful *Furze*, *Gorse*, or *Whin*, of our hills and commons, is the *Ulex Europæus*. Although so plentiful in Great Britain, there are many parts even of Europe where it does not exist. It does not grow in Sweden or in Northern Russia. In some parts of Germany it is not known to exist, and in the south of Europe it is not met with beyond Provence. It was with difficulty that Linnæus preserved a living plant of it in a greenhouse at Upsal; and it need not therefore be wondered at that, when he first visited this country, and saw our hill sides and commons robed in gold, he was so enraptured with the sight, that he fell on his knees, by the side of a furze bush, and thanked God for its loveliness. The furze is frequently employed for making hedges, and if properly kept, and not allowed to run wild, they make an excellent fence. The plant is also used as fodder for cattle, when chopped up into pieces of about an inch in length, and mixed with their food. In a dead state, furze makes excellent fuel for heating ovens, or burning in limekilns. It is frequently used for plaiting into close hurdles, and for making the sides of hovels for sheltering cattle. When chopped up in pieces of an inch in length, and sown in drills along with peas, they serve as a defence against the attacks of mice and birds. The ashes of the branches serve as a lye for washing linen.

The *Spanish Broom* (*Spartium junceum*) is a common shrub in pleasure grounds. It is sometimes called *Rush Broom*, from its shoots being long and rather bare, like rushes. Bees are very fond of the flowers, and the whole plant yields a very valuable fibre, from which linen is made. In the South of Europe it is much cultivated for this purpose. In Turkey, Italy, and in the South of France, it grows on the poorest soils, in the steepest declivities of the hills, in stony soil, where scarcely any other plant will grow. In manufacturing thread from broom, the plants are cut young in August, then gathered together in bundles, and left to dry in the sun for several days. They are then beaten with a piece of wood, and placed to steep in water for four hours. The bundles thus prepared are then taken and laid in a hollow place, on the ground, and covered with fern or straw, where they remain from eight to ten days, being sprinkled with water from time to time. After this the bundles are well washed, to remove the green or pulpy matter, till nothing but the fibre remains. It then undergoes the processes of manufacture usual for other fibre, and is afterwards converted

into fabrics; the coarsest being employed for making sacks and canvas, while of the finest, bed, table, and body linen are made. At Lucca and Pisa the shoots are soaked in the thermal waters to remove the vegetable matter. This plant also forms a valuable fodder for goats, and in the mountains of Languedoc these animals are fed on nothing else from November till April; but a long-continued use of this plant produces inflammation in the urinary passages, which, however, is easily removed by cooling drinks or a change of food. The seeds of Spanish Broom are, in moderate doses, diuretic and tonic; in large doses they are emetic and cathartic, and have been used advantageously in dropsy. The dose is from ten to fifteen grains three times a day. *Spartium monospermum* is a small shrub, from two to three feet high, which grows along the shores of the Mediterranean. It is much used along the shores in Spain for stopping the sand, and it is said to convert the most barren spot into a beautiful garden by its flowers, which last for a long time. The leaves and young branches are used as food for goats, and the shoots are employed for tying bundles. *Genista tinctoria*, or *Dyer's Broom*, grows plentifully in some parts of this country. The flowers yield a beautiful bright yellow dye, and for wool that is to be dyed green, they are mixed with woad, and preferred by the dyers to any other ingredient. When cows feed upon it, they yield butter and cheese, which has a disagreeable bitter taste. Its flowers are slightly purgative, and its seeds emetic and cathartic. In the Ukraine and Podolia the inhabitants make a decoction with it and *Rhus coriaria*, which they apply, both internally and locally, as a preventive of hydrophobia.

Cytisus Scoparius (*The Common Broom*) is a well-known native plant, growing in woods, and on the hills and commons of this country. It is much used for thatching barns and outhouses, and corn and hay ricks; the broom besoms are also well known, and the twigs are said to yield good fibre. They have also been used in tanning leather, and mixed with hops in brewing; and the flower buds, just before they become yellow, are sometimes pickled and used as capers. Some writers have attempted to show that Broom might be cultivated profitably. Bradley calculated that an acre of Broom was worth six pounds a year, for the feeding of bees alone, and would produce, in addition, a sufficient value of withs and stumps to pay the rent. It has been used as fodder, but it has an unfavourable action on the urinary organs of animals, and is not to be recommended. The plant is diuretic and cathartic, and in large doses emetic, and has the reputation of being highly advantageous in dropsical complaints. It is the tops which are used in the form of decoction, made by boiling half an ounce in a pint of water down to half a pint, and a fluid ounce taken every hour till it acts either by the bowels or the urine. The seeds have a very bitter taste, and, when given in decoction, act as a diuretic. The *Laburnum* (*Cytisus Laburnum*) is a native of this country, and may often be met with in woods and hedgerows, where it adorns and perfumes all around. There are two varieties, or, as some regard them, two species, the *English* and the *Scotch Laburnum*, the latter being called *Cytisus alpinus*. It is by far the finer one of the two; its leaves are large and glossy, and its flowers are of a darker yellow colour, and are produced in considerably longer racemes than the English variety—it also blooms later. Like much that is beautiful in this world, the Laburnum, too, conceals dangerous and deadly properties.

The seeds are violently purgative, emetic, and decidedly poisonous, and should never be allowed within the reach of children or cattle. To prevent accidents, we would recommend that, whenever the tree has done blooming, and the pods formed, they should be immediately removed. The wood is much valued for cabinet-work, inlaying, and turnery-ware. It is hard, and so heavy that it will sink in water; of a fine colour, and receives an excellent polish. In France it is called ebony of the Alps. It is used for making handles to knives and surgeons' instruments; and in Scotland the bickers, luggies, or noggins, are made with alternate staves of Laburnum, Holly, or Spindle-tree, the dark coloured being the laburnum. It is also used for musical instruments, flutes, punchbowl ladles, and several other fancy articles. Hares and rabbits are extremely fond of this tree, which they frequently injure very seriously by eating the bark, and the seeds are frequently sown in plantations, because they will touch no other tree so long as they can get a supply of laburnum; and though the plants may be eaten to the ground every winter, they will spring again next season, and yield a regular supply of winter food for these animals.

TRIFOLIEÆ.—In this division we meet with some of our most valuable agricultural forage plants. *Medicago sativa* is the *Lucern*, a valuable plant to the farmer, the cultivation of which has of late years been too much neglected. It is generally ready for the scythe towards the end of April; six weeks later it may be cut again, and so on all through the season at similar intervals, furnishing a greater quantity of the most nutritious green food than any other forage plant. *M. lupulina* is the common *Yellow Clover* or *Tréfoil*, or, as it is called also, *Hop Clover* or *Black Nonsuch Clover*. It is also a well-known agricultural forage plant. Many species of *Medicago* present curious formed pods, being generally coiled up spirally and in the most singular shapes. Some years ago, before the introduction of the new race of annuals from America and Australia, some of them were admitted into the annual flower borders under the singular names of Snails, Bee-hives, Hedgehogs, Scorpions, and similar names, suggested by the fancied resemblance of their pods to these subjects. Those called *Snails* were the pods of *M. scutellata* and *M. helix*. Hedgehogs were *M. intertexta* and *M. echinus*. The plant called *Fenugreek* (*Trigonella fœnum-græcum*) is an annual, and is cultivated in various parts of Europe for its seeds, which are used in the preparation of emollient cataplasms and enemata, and also enter into the composition of various ointments and plasters. The seeds have a strong peculiar smell, an oily, bitterish, farinaceous taste, and contain fixed and volatile oil, mucilage, bitter extractive, and a yellow colouring substance. An ounce of the seeds boiled in a pint of water renders it thick and slimy. They were formerly given to horses and cattle internally; but it is believed that they have really no medicinal action.

The *Melilots* (*Melilotus*) are ornamental and fragrant, and, as the name implies, are a favourite resort for bees. *M. officinalis*, or *common melilot*, is one of our wild plants growing in hedges and the borders of fields. When in flower it has a peculiar sweet odour, which by drying becomes stronger and more agreeable, somewhat like that of the Tonka bean; and it has been ascertained that the odorous principle of the two is identical. A water distilled from the flowers possesses little odour in itself, but improves the flavour of other substances. The flowers and seeds are the chief ingredients

in flavouring Gruyère cheese, being bruised and mixed with the curd before it is pressed. The whole plant has a bitterish taste, but is eaten and relished by cattle; it was formerly employed in medicine as emollient and digestive, and therefore used in the form of decoction for fomentations and cataplasms, but it is now quite laid aside. *M. leucantha*, also a native of Britain, has been found to afford excellent pasturage for bees, and is now sown extensively for that purpose.

The *Clovers* (*Trifolium*) are well known as furnishing to the farmer a valuable and indispensable crop. Among those generally grown for this purpose are *Red* or *Broad Clover* (*T. pratense*), *Marl-grass* or *Cow-grass* (*T. medium*); there is a perennial variety of the Red Clover which is also called Cowgrass. *Crimson Clover* (*T. incarnatum*) has of late years been rather extensively grown in the south of England, and produces a heavy crop. *Alsike Clover* (*T. hybridum*), introduced about twenty years ago from Sweden, is also a valuable forage species; and the *White Dutch Clover* (*T. repens*) has long been familiar to every one. Sometimes this is called shamrock, but erroneously, as the true shamrock is *Oxalis acetosella*, or Wood Sorrel. *T. alexandrinum* is called *Egyptian Clover*, it being universally cultivated in Egypt; being the best, and indeed the principal fodder of the cattle of that country. *T. speciosum* is the only plant made into hay in the island of Zante, and might therefore be tried advantageously in the south of England for the same purpose. *T. procumbens* is called *Hop Trefoil* and *Yellow Clover*. It has a head resembling the hop, and is common on the borders of fields in dry gravelly soils. It is not, however, considered a good herbage plant, as cattle generally refuse it. *T. filiforme*, or *Yellow Suckling Clover*, is eaten with great avidity by sheep, but it does not produce a sufficient quantity of herbage to recommend it as an agricultural plant. Some species of *Bird's-foot Trefoil* (*Lotus*) are also cultivated for their herbage. *L. Corniculatus*, and *L. major*, have both been recommended for this purpose, on heavy clay lands; the latter particularly produces an abundance of fodder, but neither of them have ever been generally cultivated; nor are they likely to become so, on account of the large quantity of bitter extractive they are found to contain, which renders them objectionable to cattle, except when mixed with a large quantity of other and more palatable herbage.

GALEGEE.—*Amorpha fruticosa* is called *Bastard Indigo*, from being once used in Carolina as a substitute for the indigo plant. *Psoralea esculenta*, called by the Canadian boatmen *Prairie Apple*, is a herbaceous perennial plant, about a foot high, with a carrot-like root, bulbous above the middle. These roots are used by the natives either boiled or raw, but generally in the latter form, and are rather insipid, though not disagreeable in taste; they are somewhat medicinal in their action, and operate as a diuretic. *P. glandulosa*, a native of Chili, where it is called *Culen*, has the smell of rue, and is considered vulnerary and purgative; the leaves are applied in the form of a cataplasm to heal wounds, and a decoction of the roots is purgative.

The *Indigo Plant* is *Indigofera tinctoria*, a native of both the East and West Indies, tropical Africa, China, and Cochin China. It is a small shrub, from two to three feet high, and is extensively cultivated in India for the colouring matter which is obtained from it, and called Indigo. It is also

cultivated in Mexico, South America, and the West Indies, and has been attempted to be grown in Spain, Italy, and, by Napoleon the First, in the South of France, but without success sufficient to induce the cultivation to be continued. The way in which indigo is managed in India is to sow the seeds in drills about a foot apart. This is done during the rainy season, and, the crop being kept clear of weeds, in the course of two or three months it will be ready for cutting; and during the rainy season a fresh crop may be cut every six weeks. The plants are not allowed to come into bloom, otherwise the leaves would become dry and hard, and the indigo produced of inferior quality. It is, therefore, just before flowering that the plant is in the greatest perfection. When cut, it is tied up into bundles about five feet and a half in circumference, and carried as quickly as possible to the factory. If kept, even for a short time, and particularly in heaps, a sort of fermentation takes place, completely destroying the indigo. When brought to the factory, these bundles are thrown into a large vat, and strongly pressed down by means of bamboos and a stout cross-beam; the whole is then covered with water, and allowed to steep for a period of ten or twelve hours, according to the skill of the planter, and the state of the weather. This part of the process requires care, for if the plants be steeped too long, the indigo will be much damaged, or "burnt," as it is termed; and if too short, the quantity of the produce will be much diminished. The liquor is then drawn off into another vat, where it is beaten and stirred with bamboos till it granulates, which generally takes from an hour and a half to three hours, and requires, particularly towards the end, the greatest care and attention to stop the beating at the instant the grains have become completely formed and separated from the liquor. If the beating be continued for too short a time, a part of the contents will be lost; and if continued too long, the grains will again be broken down, and it will be with the greatest difficulty, if at all, that they can be separated from the liquid. When the grains are properly formed, a few pailfuls of cold water, or sometimes of lime water, are added; the whole is then gently stirred with a circular motion, and the colouring matter allowed to subside. The liquor is then drawn off, and the deposit which settles at the bottom is removed into a copper boiler till it begins to ferment. It is then placed on a bamboo frame, covered with cloth, to serve as a filter, and all the liquor that will, is allowed to drain from it. It is then placed in proper frames, and strongly pressed by means of screws; then taken out and cut into cakes of the proper size, and placed in the drying house. In some districts it is in this form ready for the market; but farther in the interior of Bengal, it is in this state loosely packed in boxes, with a layer of coarse hemp, or some similar material, placed between each layer of cakes. Being allowed to stand in this state for some time, it becomes hot, and a quantity of moisture is exuded, when it is again placed in the drying house, and when thoroughly dry, packed up and sent to market.

Indigo is of an intensely blue colour, but assumes a coppery or bronze hue when rubbed by any hard substance. When heated to 550 degrees, it emits a reddish violet vapour, which condenses in minute crystals. It is insoluble in water or alcohol, but is readily dissolved by sulphuric acid, which, without destroying its blue colour, so far alters its nature as to render it freely soluble in water, and thus affords a convenient method of

applying it to the purposes of dyeing. Berzelius found in indigo four distinct principles,—1, a substance resembling gluten; 2, a brown colouring substance; 3, a red colouring substance; and 4, a blue colouring substance, which is the principle on which its value as a material for dyeing depends, and which seldom constitutes so much as one half of the indigo of commerce. This blue colouring matter is called *Indigotine*.

The indigo which is made in the West Indies is the produce of *Indigofera anil* and *I. guatimala*. The former is a native of South America, and is now growing wild in the Savannahs of Jamaica, where it may have remained from the periods when it was cultivated there. This is said to be hardier than any of the other sorts, and grows very luxuriantly even in the driest lands, but does not yield so much pulp, although the dye is of the best. *I. guatimala* yields an excellent dye, but not in such large quantities as the other species. Dr. O'Shaughnessy states that the leaf of *I. anil* is used by the natives of India in hepatitis; and that the expressed juice of *I. enneaphylla* is given as an alternative by the native physicians in old syphilitic diseases.

Common Liquorice (*Glycyrrhiza glabra*), from the root of which the extract of liquorice is obtained, is a native of the South of Europe, from Spain to Tauria, and is also found in Syria, Persia, and China. It is cultivated in almost every country in Europe. The plant has a long, succulent, tough, and pliant root, which penetrates deeply into the ground, and hence the soil best adapted for its cultivation is a light sandy loam, trenched two to three feet deep, and manured if necessary. After a plantation is made it is allowed to remain three years before it is disturbed, and then it is trenched up for the sake of its roots. The roots are either sold to the brewers' druggists, or the ordinary druggists, or herbalists, or preserved, like carrots or potatoes, in sand till required for use. Liquorice is grown in this country; at Mitcham, in Surrey, very extensively, and at Pontefract, in Yorkshire. Used medicinally, Liquorice-root is an excellent demulcent, well adapted for catarrhal affections, and irritation of the mucous membrane of the bowels and urinary passages, and is best given in the form of a decoction, made by boiling an ounce of the bruised root for a few minutes in a pint of water. Liquorice-root contains the following ingredients,—1, a peculiar transparent, yellow substance, called *Glycyrrhizin*, or *glycion*. This is of a sweet, saccharine taste, scarcely soluble in cold water, but very soluble in boiling water, with which it gelatinizes when cool; and very distinct in its constitution from sugar; 2, a crystallizable principle, first called by Robiquet *agedoïte*, but since found to be identical with asparagin; 3, starch; 4, albumen; 5, a brown, acrid resin; 6, a brown, azotised, extractive matter; 7, lignin; 8, salts of lime, and magnesia, with phosphoric, sulphuric, and malic acids.

The *Extract of Liquorice*, called also *Spanish Juice*, *Spanish Sugar*, and *Black Sugar*, is obtained from the root of this plant. The roots, having been dug up, are thoroughly cleansed, and, half dried by exposure to the air, are cut into small pieces and boiled in water till the liquid is saturated. The decoction is then allowed to rest, and, after the dregs have subsided, is decanted and evaporated to the proper consistence. The extract thus formed is made into rolls, from five to six inches long by an inch in diameter, which are dried in the air, and wrapped in bay-leaves. Much of

the best of this liquorice is made in Catalonia, but a great deal is prepared in Calabria, from *Glycyrrhiza echinata*, which abounds in that country, and is considered better and purer than that made from common liquorice. *Refined Liquorice* is made by dissolving the impure extract in water, without boiling, then straining the solution and evaporating it. It is customary to add, during the process, a portion of sugar, and sometimes perhaps mucilage or glue; and flour or starch is a frequent adulteration. *Pontefract Cakes* have for centuries been made at the town of that name, and are small lozenges of refined liquorice, impressed with a rude figure of a castle, intended to represent Pontefract Castle.

The leaves and branches of *Tephrosia toxicaria* pounded and thrown into a river or pond, very soon affects the water and intoxicates the fish, so as to make them float on the surface, as if they were dead. Most of the large ones recover, after a short time, but the greater part of the small fry perish. It is cultivated in Jamaica, for its intoxicating qualities. The same properties are possessed by *T. piscatoria*. From *T. colonila*, and *T. tinctoria*, both natives of the east, indigo is obtained. The root of *T. purpurea* is bitter, and given, by the native practitioners of India, in dyspepsia and chronic diarrhoea. The leaflets of *T. apollinea*, a native of Egypt, yield indigo, and are often mixed with Alexandrian senna. In Popayau, on the banks of the river Cauca, near Buga, the leaves of *T. senna* are used by the inhabitants instead of senna; and, in Cayenne, the twigs of *Lonchocarpus Nicou* are thrown into ponds to intoxicate fish.

The *Common*, or *Bastard Acacia* (*Robinia pseudacacia*), is a very ornamental, beautiful, and useful tree; and is the same which was introduced some years ago, from America, under the name of *Locust Tree*. It grows abundantly all over North America, from Canada to the Southern States; and is there highly valued for the hardness and durability of its wood. It was with it that most of the houses were built which sheltered the Pilgrim Fathers, and founded the City of Boston. The wood, when green, is of a soft texture, but, when dry, is very hard, close-grained, and finely veined; and in America is more valued by cabinet-makers than any timber whatever. For the axle-trees of carriages, when such were made of wood, it was in great requisition—and it makes excellent trenails in ship-building. For agricultural purposes it has been found very useful, both for posts and rails, and gate-posts, as it stands the action of wet and dry, at the surface of the ground, better than any other timber in common use. A cubic foot of the wood in a dry state weighs from forty-eight to fifty-three pounds. If we compare its toughness, in an unseasoned condition, with that of oak, it will not be more than .08 less. Its stiffness is equal to .99 of oak, and its strength nearly .96; but were it properly seasoned, it might be found much superior to oak in strength, stiffness, and toughness. A piece of unseasoned acacia, two feet six inches long, and one inch square in the vertical section, broke, when loaded with a weight of 247 lbs. As an ornamental tree, the acacia is well worthy of notice, its graceful foliage, and profusion of fragrant flowers, rendering it peculiarly adapted for parks and pleasure-grounds. In St. Domingo its flowers are used for making a distilled liquor, and its roots and leaves contain a considerable proportion of sugar. The *Rose Acacia* (*Robinia hispida*), is a great favourite in shrubberies, and very

ornamental, with its racemes of gay flowers, but they are quite void of fragrance.

The roots of several species of *Caragana* smell like liquorice, as *C. altagana* and *C. chamlagu*. The wood of *C. arborescens* is hard and compact, very tough, yellow on the outside, but waved and striped with bay, and red within. The leaves are said to be good food for cattle, and it has been supposed that they contain a blue colouring-matter, like indigo. The seeds are eaten by poultry; the bark is tough and fit for tyeing, and the twigs may be used as withies. *C. spinosa* is admirably adapted for making hedges, on account of its long branches and strong thorns. It is a native of China, and about Pekin they stick the bushes in clay, on the tops of walls, to prevent persons from getting or looking over them. *Colutea arborescens*, *Bladder Senna*, is a native of the South of Europe, and may be found even in the ascent to the crater of Mount Vesuvius, where no other plant exists. The leaves are purgative, and are used in some parts of Europe as senna, which is said to be sometimes adulterated with them, but its action is comparatively very feeble. The seeds, in the dose of one or two drachms, excite vomiting.

ASTRAGALEÆ.—The seeds of *Phaca batica* are used as a substitute for coffee, in Hungary. The plant, which was formerly grown in gardens, as an annual flower, under the name of *Caterpillars*, is *Astragalus hamosus*, or *Hook-podded Milk-vetch*. It was so called in reference to the shape of the pods. *A. Boeticus* is grown extensively on the continent, under the name of *Swedish Coffee*, for its seeds, which are the best substitute for coffee that has yet been discovered. Two-thirds of the seeds are mixed with one-third of coffee-beans, and the two ingredients are mixed together, preserved in well-corked bottles, or thoroughly-closed vessels, and taken out as they are wanted to be ground. The leaves of *A. glycyphylus*, a native of Britain, and called *Liquorice Vetch*, have at first a sweetish taste, which soon changes on the palate to a nauseous bitter.

Several species of *Astragalus* yield gum, and it is from *A. verus* that *Gun Tragacanth* is obtained, although some others yield a product which is very similar to it. This plant is a small shrub, two or three feet high, and a native of the Levant. The gum exudes from it naturally, from July to September, either from wounds made accidentally, or from fissures caused by the force of the juice during the hot weather. As the juice is more or less abundant, the gum exudes in twisted filaments, which sometimes assume the form of a small worm, elongated, rounded, and compressed, and it is the finest and the purest that assumes this form. It is whitish, or yellowish-white, and translucent, resembling horn in appearance, but sometimes the pieces are irregularly oblong, or roundish, and of a slightly reddish colour. *Tragacanth* is inodorous, with but little taste, and when put into water it absorbs a great proportion, swells very much, and forms a soft adhesive paste, but does not dissolve. It is wholly insoluble in alcohol, and appears to consist of two distinct constituents—one soluble in water, and resembling gun arabic, and the other capable of swelling in water, but not dissolving. It is a demulcent, and on account of its difficult solubility, is not often given internally. It is extensively produced in Persia, where it is much consumed in the manufacture of silk, and the preparation of comfits. It is exported to India, Bagdad, and

Bassorah. The gum is also obtained from *A. gummifer*, a native of Mount Lebanon, but not so plentifully. *A. creticus*, and *A. massiliensis* also yield it.

Viciæ.—In this tribe we have those leguminiferous plants which are cultivated for food, and which are generally distinguished by the name of pulse. *Cicer arietinum* is the *Ram's-head* or *Chick Pea*, so called from the seeds having the appearance of a ram's head, or of a young bird coiled up in the shell. The plant is much cultivated in the South of France, and in Spain, for its seeds, which are eaten as an article of food, and held in great estimation by the inhabitants. During the great heats of summer, the leaves of this plant sparkle with very small tears, of a viscous and very limpid liquid, extremely acid, and which has been discovered to be oxalic acid in its pure state. All the cultivated varieties of *Beans* have originated from *Faba vulgaris*, and this includes both those which are grown in gardens and for agricultural purposes; the only difference between them being that which has arisen from cultivation and other circumstances. Beans, in the ripe state, are mostly used as food for horses and pigs. The flour is more nutritious than that of oats, and hence, in equal weight, a cheaper feed; but they are more difficult of digestion. The haulm is also considered very nutritious, and of considerable value as fodder. All the varieties of garden *Peas* which are cultivated, have originated from *Pisum sativum*, a native of the South of Europe; and field *Peas* are varieties of *Pisum arvense*. The *Lentil* is a native of Europe, in corn-fields, and is called *Ervum lens*. It is extensively cultivated all over the South of Europe, in the East, and in Egypt, where the seeds form a very important article of food. They are eaten by Roman Catholics, in the time of Lent, both in soups, and dressed in butter sauce as haricots. The *Flour of Lentils* is considered very wholesome, and Dr. Playfair found that it contained more nitrogenous matter than any of the leguminiferous plants; and, as a proof of its nutritious qualities, the Hindoos always have recourse to lentils, in addition to their rice, when engaged in laborious work. Those substances which are sold under the name of *Rev-lenta arabica*, and *Erevlenta arabica*, are nothing else but the flour of Lentils. The *Tare*, or *Vetch*, is *Vicia sativa*, and is cultivated as a forage plant for cattle.

The *Everlasting Pea*, is *Lathyrus latifolius*, an old favourite in flower-gardens. It is said to yield an abundance of honey to bees, who are very fond of it. The roots of *L. tuberosus* are eaten in Holland, and are considered very wholesome. *L. sativus*, or *Chickling vetch*, is sown in Switzerland as fodder for horses, and meal made from the seeds forms a white, light, pleasant bread; but it produced such dreadful effects in the 17th century, that the Duke of Wirtemberg, in 1671, issued an edict, forbidding the use of it, and which was enforced by two others, under his successor, in 1705, and 1714. Mixed with wheat flour, in half the quantity, it makes a very good bread, and appears to be harmless; but bread made with this flour exclusively, has brought on extreme rigidity of the limbs, in those who have used it for a continuance, inasmuch that the exterior muscles could not by any means be redneed, or have their natural action restored. The disease appeared on a sudden, without any pain, and being neither painful nor fatal, it was usually submitted to with patience, and was considered incurable. Swine fed on this meal lost the use of their limbs,

but got very fat lying on the ground. Horses and other animals fed upon it lose the use of their legs, which become rigid. In Italy, however, the peasants eat it boiled, or mixed with wheat flour, in the quantity of one-fourth, without experiencing any harm. *L. odoratus* is well known under the name of *Sweet Peas*, which form a fine covering to a trellis, or a screen, in a flower-garden; their gay and fragrant flowers, with their rambling habit, making them particularly adapted for such a purpose. *Orobus tuberosus* is an abundant native of Britain, in woods and bushes. It is called *Wood Pea*, or *Heath Pea*. The roots are creeping, swelling into tubers, at irregular intervals; and the Highlanders of Scotland have a great partiality for them, and dry and chew them to give a greater relish to their whiskey. They also regard them as good against chest complaints, and say that by the use of them they are able to withstand hunger and thirst for a long time. In Bredalbane and Ross-shire they sometimes bruise and steep them in water, and make an agreeable fermented liquor with them. They have a sweet taste, something like roots of liquorice, and, when boiled, are well-flavoured and nutritive; and, in times of scarcity, have served as an article of food. When well boiled, a fork will pass through them; and, slightly dried, they are roasted and served up in Holland and Flanders like chestnuts.

Hedysareæ.—The *Ground Nut*, or *Earth Nut*, which is met with in the fruiterers' shops in this country, is the fruit of *Arachis hypogæa*, a native of South America, but cultivated in all the Southern States of North America, in the South of Europe, in Africa, and in Asia. It is an annual plant, growing to the height of two feet, with a trailing, straggling, habit. In South Carolina this is cultivated to a great extent, and there the inhabitants roast the "nuts," as they are called, and make use of them as chocolate. When fresh, the seeds, or "nuts," have a sweet taste, not unlike that of nuts or almonds. The natives make them their principal food, and they form an article of great consumption among the negroes. An extremely sweet, fixed oil is extracted from these seeds, which, according to some, is quite equal to olive oil, and does not become rancid, but, on the contrary, improves with age. There is something remarkably interesting in the economy of this plant. After the flowers fall off, the young pods are forced into the ground, by a natural motion of the stalks; and there they are buried, and are only to be obtained by digging three or four inches under the soil, and hence their name. *Adesmia balsamifera*, a native of Chili, where it is called *Jarilla*, is a plant of great beauty, and yields a balsam of highly agreeable odour, which is perceptible at a great distance, and is found to be of much efficacy in healing wounds.

One of the most curious plants of this family is the *Moving Plant* (*Desmodium gyrans*), a native of Bengal. It is a biennial, and frequently cultivated in stoves, or on a hotbed, in this country. The lateral leaflets keep constantly moving all day long, without any external impulse being given to them. They move up and down, and circularly, this last motion being performed by the twisting of the footstalks; and while one leaflet is rising, its corresponding one opposite is generally being depressed. The motion downwards is generally quicker and more irregular than the motion upwards, which is steady and uniform. These motions are observable for twenty-four hours in the leaves of a shoot which is lopped off from the

plant, if kept in water. If, from any obstacle, the motion is retarded, upon its removal, it is renewed with greater velocity. The motion is most evident when the sun's rays are upon the plant; it would therefore appear that the action of the sun's rays upon it, occasions the movement of the leaflets.

There is a pretty plant sometimes grown in flower-gardens, under the name of *French Honeysuckle*, but not now cultivated so much as it once was; it is *Hedysarum coronarium*, and is a biennial plant, a native of Spain and Italy, where it produces a great quantity of herbage, and affords excellent nourishment for horses and mules, both green and made into hay; but it is too tender to attempt to cultivate it in this country. *Saintfoin*, which supplies such an excellent fodder, both green and made into hay, for horses in this country, is *Onobrychis sativa*.

Hebrew Manna is *Athagi maurorum*, a shrub, from two to three feet high, growing in Egypt, Syria, Persia, and the East. It is on this plant that manna is found in Mesopotamia. This manna is a natural exudation from the leaves and branches of the shrub, which takes place only in very hot weather. At first it resembles drops of honey, but soon thickens into small, round, solid grains, the size of a coriander seed, of yellowish-white colour, caking together, and forming an opaque mass, in which are found portions of the thorns and fruit of the plant. It is collected with more or less care, and is valued according to its purity, which is indicated by the distinctness of the granulations. It is never found in the shops of Europe; but in many parts of the East it is used as a substitute for sugar. *A. camelorum*, and *A. nepalensis*, also secrete the same substance, which, however, is not the manna used in this country, but is known to be the manna of the desert.

Fraxoleæ.—The white root of *Clitorea Ternatea* is, according to Dr. Ainslie, beneficial in cases of croup, and acts as an emetic; but Dr. O'Shaughnessy states that he has never been able to detect these effects. He found, however, that an alcoholic extract acts as a brisk purgative, in doses of from five to ten grains; but griping and tenesmus are often produced, and, during the operation of the medicine, the patient is feverish and uneasy, and therefore he does not recommend the use of it. From *Soja hispida*, a native of Japan, and various other parts of the East, the substance known as *Soy*, is obtained. It grows to the height of four feet, and has leaves like the common kidney-bean, and is called *Dauksér* by the Japanese. The seeds are usually put into soups, and are the most common dish there, inasmuch that the Japanese frequently eat them three times a day. Kæmpfer states that, pounded and taken inwardly, they afford relief in asthma. From them a substance called *Miso* is obtained, that is used as butter, and like wise a celebrated pickle, called *Soy*. *Miso* is made by boiling the seeds, which are called *mame*, for a considerable time in water till they are soft; and then they are beaten to a pulp, along with a large quantity of salt. A certain proportion of rice is then added, and, having worked the whole up together, it is then removed into a wooden vessel, which previously contained common ale, and in two months it is fit for use. *Soy* is made by taking equal quantities of the seeds, boiled to a certain degree of softness; corn, whether barley or wheat, roughly ground; and common salt. The seeds and pounded corn being properly mixed, the

mixture is covered up, and kept for a day and a night in a warm place, to ferment. The mass is then put into a pot, and covered with salt, pouring over the whole two measures and a half of water. It is then stirred, at least once a day, for two months; after which it is filtered, the mass pressed, and the liquor preserved in wooden vessels. The older it is, the better and the clearer; and if made of wheat instead of barley, the blacker. The first liquor being removed, they again pour water on the remaining mass, which, after stirring some days, as before, they express a second time, and thus obtain an inferior sort. Soy is much superior to the Chinese *Kitjap*, although it is also sold in this country under the name of Soy.

The seeds of *Mucuna urens* are like an eye, and hence the plant has been called *Ox-eye Bean*, in the West Indies, of which it is a native. *M. pruriens* is a native of the East and West Indies and Guinea, and is called *Cow-itch*, or *Cowage*. The pods are about four inches long, thickly set on the outside with stiff brown hairs, which, when handled, stick to the fingers, and cause a most intolerable itching. These hairs possess medicinal virtues. The ripe pods are dipped in syrup, which is again scraped off with a knife; and, when the syrup is rendered as thick as honey with the hairs, it is fit for use. It acts mechanically as an anthelmintic; occasions no uneasiness, and may be safely taken, from a teaspoonful to a tablespoonful, in the morning fasting. The worms are said to disappear with a second or third dose. *Erythrina umbrosa*, or *Shady Coral Tree*, is very much grown in Caraccas, and in Trinidad, for shading the young plantations of Cacao, or Chocolate nut. A decoction of the bark of *E. Loureira* is employed against intermittent fevers, and the leaves are used to cleanse ulcers. The seeds of the *Abyssinian Coral Tree*, *E. Abyssinica*, are called *Carats*, in Abyssinia, and are used in weighing gold and precious stones.

The juice which flows from the wounded bark of *Butea frondosa*, or *Dhak Tree* of India, is called *Butea Gum* or *Bengal Kino*. It is in small elongated tears or irregular angular masses, less in size than a grain of barley, apparently black and opaque, but translucent and of a ruby red colour when examined in small fragments by transmitted light. This gum is very astringent to the taste, does not adhere to the teeth when chewed, and tinges the saliva red. It contains 73·26 per cent. of tannin, 5·05 of soluble extractive, and 21·67 of gum and other soluble substances. Besides being rich in tannic and gallic acids, it contains arabine and ulmine. It is used in India for precipitating indigo and in tanning; and, employed medicinally, it acts with powerful astringent effects. Dr. O'Shaughnessy found two or three grain doses an excellent remedy in many forms of chronic diarrhoea; and as an external astringent application, he says it is quite unrivalled. The expressed juice of the fresh flowers, and infusions of the dried flowers, yield a water-colour brighter than gamboge. The lac insects are frequently found on the smaller branches and petioles of the tree, but whether the juices of the bark contribute to improve their red colouring-matter has not yet been determined. *B. superba* possesses similar properties. Both of these, which grow very abundantly in India, furnish the natives with firewood, and their bark and roots yield a fibrous matter which is used as cordage, or beaten to a kind of oakum used for caulking boats. Although

this fibre is unimportant as an object of commerce, it is of great use to the natives themselves for agricultural and domestic purposes, as it is possessed of a good deal of strength. The roots of *Apios tuberosa* are eatable, and are sold in some of the German markets.

The *Scarlet Runner*, or *Scarlet Bean*, which not only beautifies our gardens but furnishes a wholesome vegetable for our tables, is *Phaseolus multiflorus*, a native of South America. Although it is treated as an annual plant in this country, it is in reality a perennial; and were it not that our winters are so severe, it would remain in the ground and shoot up afresh every year. The roots may be preserved, as we have frequently done, during the winter in a dry cellar among sand, away from the influence of frost, and planted again in the spring in the same way as potatoes are; and we have even seen a row of kidney beans stand during a mild winter with some long litter strewed over their roots. A peculiar character in the growth of the *Scarlet Runner* is, that, unlike most other twiners, it twists in a contrary direction to the course of the sun. The *Dwarf Kidney Beans* or *Haricots* are *P. vulgaris*, and they too are a well-known and wholesome vegetable. The ripe seeds boiled furnish a nutritious diet. The *Haricot de Soissons* is *P. compressus*. Those called *Princesse* and *Flageolet nain* are *P. tumidus*; and *Haricots de Prague* are *P. sphericus*. The seeds of *P. lunatus* are cooked and eaten in Cochin China as well as in the East Indies, but the plant is grown more for the beauty of the seeds than for their flavour; the seeds of *P. tunkinensis* are also cooked and eaten by the inhabitants. The roots of *P. ratistus*, according to Dr. Royle, are narcotic; and the leaves of *P. trilobus* are said to be tonic and sedative, and are used in India as cataplasms to weak eyes. *Dolichos filiformis*, a native of Jamaica, where it is called *Cat's-claws*, is used as a purgative ingredient in diet drinks, and is said to answer in cases of dropsy. The seeds of *D. hastatus* are eaten by the natives of the east coast of Africa; and the pods of *D. Lubia* are cooked and eaten in Egypt. *D. sphaerospermus* is a native of Jamaica, where it is called *Calavana* or *Black-eyed Pea*, and its seeds are sweet and as good for food as any of the kidney beans. The pods of *Lablab vulgaris* are eaten both in the East and West Indies and in Egypt, as are also those of *L. nankinicus*, a native of China. The turnip-shaped tuber of *Pachyrhizus angulatus* is eaten, when young, both raw and boiled, by the inhabitants of India and Mauritius. The tubers of *P. trilobus* are two feet long and nearly round, and are boiled and eaten by the inhabitants of China and Cochin China. The seeds of *Psophocarpus tetragonolobus* are used in the Mauritius as we do peas. The seeds of *Voandzeia subterranea* are used in Surinam and various parts of Africa in the same way, either ripe or unripe.

Cajanus flavus is a native of the East Indies, but is cultivated in South America, the West Indies, and in Africa. It is a shrub about nine feet high, and is chiefly planted in rows as a fence to sugar plantations in the West Indies. The seed is much eaten by the poorer inhabitants and negroes, and is esteemed a wholesome pulse. In Martinico, even the better sort of people hold the seeds in high estimation and prefer them to common peas. In Jamaica they are principally used for feeding pigeons, and hence the plant has been called *Pigeon Pea*. Hughes, in his *Natural History of Barbadoes*, says, "I know of no part of this shrub but what is of some use. The wood is good for fuel, and by the often falling of its numerous leaves

the land it grows upon is very much enriched; and its fruit is of great service by affording hearty nourishing food to man and beast. The peas, green or dry, are boiled and eaten, and esteemed very wholesome, especially if eaten in the wet time of the year; for, being of a binding quality, they prevent diarrhoeas and dysenteries, so common in wet seasons. The branches, with the ripe seeds and leaves, are given to feed hogs, horses, and other cattle, which grow very fat upon them."

Those bright scarlet peas with a jet black spot on one end of them, which come from the East and West Indies and are used as beads, are the seeds of *Abrus precatorius*. The leaves and root of this plant taste like liquorice, and hence it is called in the West Indies *Wild Liquorice*. The roots abound in sugar, and are a perfect substitute for liquorice in every respect. The seeds are very beautiful, and on that account are strung for beads and ornaments by the inhabitants of those countries where it grows, and in this country they are put to the same uses. The Roman Catholics convert them into rosaries, and hence the specific name.

Dalbergiææ.—The root of *Hecastophyllum monetaria*, when cut, furnishes a purple juice. The wood is red, yielding a resin resembling Dragon's Blood. *Pterocarpus draco* is one of the trees yielding a resin which resembles and has been sold for Dragon's Blood; but that article, as it is now found in commerce, is the produce of *Calamus draco*. This tree is a native of Carthagera and other parts of the West Indies, and grows to the height of thirty or forty feet. The wood is white and heavy, the bark thick, of a rusty grey colour; when cut transversely it exhibits no marks of redness at first, but in a short time it is variegated with many blood-red dots that collect into little globules or tears, and these harden after a short exposure. The bark, wood, and leaves, have an astringent taste. *African Kino* was discovered by Mungo Park to be the produce of *P. crinaccus*, a native of the countries on the banks of the Senegal and Gambia; and it was this resin which was first introduced and examined by Dr. Fothergill, and to which the name Kino was originally applied, but it is not now met with in commerce, there being several other trees which yield the same product and which have taken its place. *East Indian Kino* has been ascertained to be the inspissated juice of *P. marsupium*, a tree forty feet high, and a native of the mountains of Coromandel. It is the variety at present most used and most highly esteemed. It is very brittle, breaks readily between the fingers, and is easily pulverized. When chewed, it softens in the mouth, adheres somewhat to the teeth, and tinges the saliva a blood-red colour.

Kino is without odour, and has a bitterish, highly astringent taste, leaving a somewhat sweeter taste behind. It burns with little flame, and does not soften by heat. It imparts its virtues and a deep-red colour to water and alcohol, and is soluble in boiling water. It consists chiefly of a modification of tannic acid or tannin, with extractive gum, and sometimes probably a little resin. In its medical action it is powerfully astringent, and is used for the suppression of morbid discharges.

Pterocarpus santalinus furnishes the *Red Sanders Wood* of commerce. The tree is a native of India, inhabiting the mountains of Coromandel and Ceylon, where it attains the height of upwards of sixty feet. The wood is dark-red with black veins, heavy, close-grained, capable of receiving a good

polish, and sinking in water. It is only the old wood which is employed as a dye, young wood containing very little colouring matter; and the principle of this colouring matter has been called *Santalin*. Red Sanders is very little used in this country as a dye-stuff, but apothecaries often employ it to give a red colour to tinctures. In India it is used for dyeing silk and cotton; the Arabs use it as an astringent, and in this country it is frequently employed as the basis of various dentifrice mixtures. The bark of the root of *Piscidia erythrina* or *Jamaica Dogwood* is powerfully narcotic, and is employed for stupefying fish in ponds and rivers; and it has been found serviceable in procuring sleep and relieving pain in an extraordinary manner. The saturated tincture applied on cotton to a carious tooth has been found highly efficacious in toothache. Dr. Hamilton, of Plymouth, found that a dose of a fluid drachm of the tincture, made by macerating an ounce of the bark in four fluid ounces of rectified spirit for twenty-four hours and then filtering, had the effect of causing profuse perspiration with profound sleep for twelve hours, with perfect relief from severe toothache. The tree is considered in Jamaica a good timber tree. The wood is hard and resinous, and lasts almost as well in as out of water; it is of a light-brown colour, coarse, cross-grained, and heavy. *Geoffroya spinosa* produces a fruit very like an almond, with a downy rind of a greenish-yellow colour. The pulp is soft, sweet, and yellowish, has a nauseous smell, and stains the hands a rust colour, which does not easily wash out. The nut, or stone, is white, adheres closely to the pulp, and contains a white kernel which has a farinaceous taste. *Andira inermis* is a native of the West India islands and Guiana, and is called *Cabbage tree*. Its bark is considered powerfully anthelmintic, and has a mucilaginous sweetish taste and a disagreeable smell; it is cathartic, and in large doses is apt to cause vomiting, fever, and delirium; great caution must be observed in its administration, as instances of death have occurred from its use. The seed of *Dipterix odorata* is the *Tonka* or *Tonquin Bean*, familiarly known from being so frequently used for communicating an aromatic odour to snuff. The tree is large, and a native of Guiana. The bean has a strong, aromatic, agreeable odour, and a bitterish, aromatic taste; and its active principle is a crystallizable, odorous substance analogous to the volatile oils and camphor, and called *coumarin*. The substance is sometimes found in a crystalline state between the two lobes of the kernel. The Creoles put these beans into chests to drive away insects, as well as to communicate an agreeable odour.

Sophoreæ.—The tree which yields *Balsam of Peru* is supposed to be *Myrospermum peruvianum*, although there is still some doubt on the point. It is a lofty tree, growing in Central America. The balsam is collected from it exclusively by the natives of the country, within a small district called the Balsam Coast, extending from Acapulco to Port Libertad. The balsam is obtained by making incisions in the bark, which is slightly burned, to cause it to flow more freely. Cotton or woollen rags are then inserted into the apertures, which, after they are saturated, are removed and replaced by others. When a sufficient quantity is collected, the rags are boiled in water, in large jars, and the balsam rising to the surface is skimmed off, and put into calabashes or bladders; it is then conveyed to the town of Souzonate, where it is purified by straining, and put into jars for exportation. From the fruit a substance called *White Balsam* is

obtained by expression. It is of a somewhat solid consistence, and the smell, though quite distinct from that of the Balsam of Peru, is not disagreeable, and a resinous substance has been obtained from it, which is readily crystallizable, and has been called *myroxocarpin*. A tincture of the fruit is also much used in Central America. It is also used as an external application to gangrenous or indolent ulcers, and as a wash to the face, to remove freckles. Balsam of Peru is a warm, stimulating tonic and expectorant, and has been recommended in chronic catarrhs, certain forms of asthma, phthisis, and other pectoral complaints, attended with debility; it has also been used in leucorrhœa, amenorrhœa, chronic rheumatism, and palsy. It is thick, like syrup or honey, of a dark reddish brown colour, fragrant odour, and warm, bitterish taste, leaving a burning sensation in the throat. When exposed to flame it takes fire, diffusing a white smoke and fragrant odour. It consists of resin, essential oil, and benzoic acid. Alcohol, in large proportion, entirely dissolves it, and boiling water extracts the benzoic acid. This was called Balsam of Peru, from being imported originally from that country; but it is now shipped from various ports of Central America, where it is exclusively produced. *M. pubescens* is also a lofty tree, inhabiting the same districts, and is called *Myrrh-seed*, *White Balsam*, or *Quinquino*, but it must not be confounded with Quina, from which it is very distinct. The bark is filled with white resin, which, according as it abounds in greater or less quantity, changes colour, to citron yellow, red, or dark chesnut. The taste and smell are pleasant, balsamic, and aromatic, resembling that of Balsam of Peru, and is sold by druggists under the name of *White Balsam*. It is found in low, warm situations, near the river Marañon, on the Pacific coast of Central America. The balsam is not collected by the Indians; they only collect the barks most filled with resin, condensed into drops or lumps, and the fruits, both of which they sell to neighbouring provinces for the purpose of perfuming cloth and apartments. It is called perfume of quinquina, to distinguish it from the true perfume, which is made of benzoin, storax, and ambergris. The fruit, as well as the bark, being reduced to a coarse powder, they mix it with oil of maria, earana, jacamaca, lera, and sebo, and make with it little plasters, which they apply to the temples and behind the ears, to mitigate the pains of the headache and the toothache. It is said to close recent wounds, strengthen the brain, mitigate pains proceeding from agues, and dissipate the shivering produced by fevers. The *Balsam of Quinquino* is procured by incision at the beginning of spring, when the showers are gentle, frequent, and short. It is collected in bottles, where it keeps liquid for some years, in which state it is called *White Liquid Balsam*. But when the Indians deposit this liquid in mats or calabashes, which is commonly done in Carthagena, it hardens into a resin, and is then called *Dry White Balsam*. The wood of the Quinquino is compact, heavy, and durable, but is difficult to work, on account of its uneven grain. It is never exposed to attacks of worms, on which account it is made use of for beams.

Balsam of Tolu is yielded by *Myrospermum toluiferum*, a native of South America, growing in Carthagena, and abundantly in the neighbourhood of Tolu. It is procured by making incisions in the bark during the hot season, and collecting it in spoons which are made of black wax, and

then it is put into calabashes, baked earthen jars, or small glass vessels. It is at first liquid, resembling a thick tenacious turpentine, but soon concretes, and dries into solid, brittle, golden-yellow masses. It is shining, translucent, with a highly fragrant odour, and a warm, somewhat sweetish and pungent, but not disagreeable, taste. Exposed to heat, it melts, inflames, and diffuses an agreeable odour while burning. It is entirely dissolved by alcohol and the essential oils. Boiling water extracts its acid. Distilled with water, it affords a small proportion of volatile oil, and if the heat be continued, the acid matter sublimes. When dissolved in the smallest quantity of the solution of potassa, it loses its own odour, and acquires that of the clove pink. Its ingredients are resin, cinnameic acid, and volatile oil. Balsam of Tolu is a stimulating tonic, with a peculiar tendency to the pulmonary organs, and is therefore much used in chronic catarrh, and other pulmonary affections; but it should never be administered till after the reduction of inflammatory action.

Virgilia capensis, called at the Cape *Keurboom*, is a handsome tree, from fifteen to twenty feet high, and from a foot and a half to two feet in diameter. The wood is rather light and soft, and liable to the attack of worms, but looks well when polished, and is occasionally used by the settlers for yokes, rafters, and spars. The barks of *V. lutea* and *V. aurea* afford a yellow dye. *Cercis siliquastrum*, a native of the South of Europe, is called *Judas Tree*, *Red Bud*, or *Love Tree*. The flowers are esteemed by some as an addition in salads, from their agreeable poignancy. The wood is very beautiful, and veined with black, takes an excellent polish, and may be employed for many useful purposes. The flowers of *C. canadensis* are also used by the inhabitants of North America, as an ingredient in salads, and the French Canadians pickle them. The wood is of the same colour and texture as the preceding species, and the young branches dye wool of a very fine colour.

Casalpinaeæ.—*Guilandina bonduc*, or *Nicker Tree*, is a native of the East Indies, Arabia, Africa, and South America. It is a shrub about ten feet high, and in India the seeds are used in combination with *Agathotes chirayta*, in intermittents and remittents. The seeds are used for beads, and hence the name *bondoc*, which, in Arabic, signifies a necklace. *G. bonducella* is called the *Small bonduc*, or *Nicker Tree*. It is a smaller shrub than the preceding, and is a native of the same countries. The seeds are about the size and shape of marbles, and as such are frequently used by boys. In Egypt both they and those of the preceding species are strung by women in necklaces, and hung round the necks of their children, to guard them from evil influences and sorcery. These are often thrown on shore, on the coast of Scotland and Ireland, and are called *Molucca Beans*. They act as a powerful tonic, and a valuable febrifuge. The kernels are very bitter; reduced to powder, and mixed with black pepper, they are used in India, in three and six grain doses, in ague, with the best results; and powdered small, with castor oil, they are applied externally in hydrocele. The roots are considered, in Ambuyna, to be a good tonic.

Casalpinia brasiliensis is the tree which yields the *Brasiletto*, or *Brazil-wood* of commerce. It is a tree twenty feet high, and grows in Jamaica and St. Domingo. It is an excellent timber wood, but seldom exceeds eight or ten inches in diameter. It is elastic, tough, and durable,

and takes a fine polish ; of a beautiful orange and red colour, full of resin, and yields a fine tincture by infusion. It is nearly without smell, has a slightly sweetish taste, stains the saliva red, and imparts its colouring matter to water. Its chief use is in dyeing, but it has of late years been much superseded by Camwood, which is imported from the Coast of Africa. A red lake is prepared from it, and it is an ingredient in red ink. Its dyeing properties are owing to a crystallizable colouring principle, named *breselin*. *C. sappan* furnishes the *Sappan wood* of commerce. It is a native of the East Indies, and grows forty feet high. The wood possesses much the same properties as the preceding, and constitutes an article of very important trade to Calcutta. The wood, called by the Hindoos *bukum*, is solid, heavy, hard, compact, whitish, while fresh, but reddening on exposure to the air. It has neither taste nor smell, communicates a fine red colour to water, and the alkalis remove more colouring-matter, when the water ceases to act. With alcohol it forms a deep red tincture. Like logwood, it is considerably astringent, and contains a principle, if not identical with, at least much resembling *Hæmatin*. The wood is much used by the Zelinga dyers, for making a cheap red colour, which does not stand. *C. crista* and *C. echinata* have the same properties as the preceding, but the latter furnishes the best Brazil wood, under the name of *Pernambuco Wood*. Every part of *C. bijuga* has a strong balsamic scent when bruised. The pods of *C. coriaria*, known by the common names of *Divi Divi* and *Libidibi*, are used by the inhabitants of Curaçoa and Carthagera, and other places within the tropics, for tanning hides. They contain one of the most astringent substances known. The pods are pounded in a mortar, and then steeped in water in large vats. When the water is well impregnated, the hide is thrown in to soak for four hours ; then taken out to be rough-dressed, and replaced in the vat for another four hours ; and is completed in about a couple of days. There is a considerable quantity of this article now imported to this country for the same purpose.

Poinciana pulcherrima is called *Barbadoes Flower Fence*, from being used in that island for hedges to divide the lands. It is also called *Spanish Carnation*, *Wild Senna*, and *Barbadoes Pride*. The flowers are beautifully variegated, with deep red, or deep orange colour, yellow, and some spots of green ; sometimes the flowers are deep orange, sometimes yellow, without any mixture. All parts of the plant are supposed to be very powerful amenagogues, and are frequently used for that purpose among the negroes. Hughes says that one of the flowers, bruised and steeped in breast-milk, is a gentle anodyne, and as such is often given to quiet very young children.

Hæmatoxylon campechianum furnishes the *Logwood* of commerce. It is a medium-sized tree, varying, according to situation, from twenty to forty feet high, and is a native of Campeachy, the shores of Honduras Bay, and other parts of tropical America ; but it has been introduced into Jamaica, where it has become naturalized. The flowers are fragrant, and give out an agreeable odour, said to resemble that of the jonquil. The wood is hard, compact, and heavy, with a specific gravity higher than that of water ; has a fine grain, and is susceptible of a fine polish. It is chiefly employed by the calico printer to give cotton a black or a brown colour ; if it be dyed with an alum mordant, in a decoction of logwood, it becomes black. Iron mordant and logwood also dye black, but with an un-

pleasant brown shade. Logwood is generally crooked, and seldom thicker than a man's thigh. It was first cultivated in Jamaica, in 1715, from seeds brought from the Bay of Campeachy. It makes impenetrable and beautiful fences. Used medicinally, Logwood is a mild astringent, and is well adapted to the treatment of that relaxed condition of bowels which is apt to succeed cholera infantum; and it is occasionally employed with advantage in chronic diarrhœa, and chronic dysentery. Its colouring properties depend on the presence of a peculiar principle, called *hematoxylin*, or *hematin*.

Tamarinds are the fruit of *Tamarindus indica*, a large spreading tree forty to sixty feet high, a native of the East and West Indies, Egypt, and Arabia. It produces timber which is heavy, firm, and hard, and is useful for many building purposes. The pulp contained in the pods is used both for food and medicine. The tamarinds which are brought from the East Indies are darker and drier, but contain more pulp; being preserved without sugar, they are fitter to be put into medicines than those from the West Indies, which are much redder, but, being preserved with sugar, are more pleasant to the palate. Tamarinds are preserved in two ways; commonly by throwing hot sugar from the boilers on the ripe pulp, but a better method is to put alternate layers of tamarinds and powdered sugar in a stone jar, by which means they preserve their colour and taste more agreeably. Preserved tamarinds should be fresh and juicy, and have an agreeable smell and taste. They should not have a musty smell; the seeds should not be soft and swollen, and the blade of a knife should not get a coating of copper by being immersed in them, it being said that copper may sometimes be detected in them, being derived from the boilers in which they are frequently prepared. Tamarinds are laxative and refrigerant, and, infused in water, form a highly grateful drink in fevers. Convalescents often find the pulp a pleasant addition to their diet, and useful by preserving the bowels in a loose condition. It increases the action of the sweet purgatives, cassia and manna, but weakens that of the resinous cathartics. In Curaçoa the natives eat abundance of the pulp raw, without any inconvenience except that of gently relaxing the bowels.

The true officinal senna is the produce of *Cassia lanceolata* and *C. obovata*, and is called *Alexandrian Senna*, from the port at which it is shipped; but it is collected far in the interior of the country in Upper Egypt, beyond Sienne. The plants yield two crops annually, one in spring and the other in autumn. The natives cut the plants, and, having dried them in the sun, strip off the leaves and pods, which they pack in bales and send to Boulac, in the vicinity of Cairo. The senna of Upper Egypt is mixed with the leaves of *Cynanchum olecefolium*, and sometimes with those of *Tephrosia apollinea*, the former being detected by their length being almost always more than an inch, their greater thickness and firmness, the absence of any visible lateral nerves on their under surface, and their lighter colour. The latter are known by their downy surface; obovate-oblong, emarginate shape; their parallel, unbranched, lateral nerves; and by being usually folded longitudinally. *Tripoli Senna* is the produce of *C. æthiopica*. It is much more broken up than Alexandrian senna; the leaflets are shorter, less acute, thinner and more fragile, and their nerves are much less distinct. It is supposed to be collected in Fezzan, and is brought to Tripoli for

exportation. *Indian Senna* is produced in Arabia, but is so called from being brought to this country from Calcutta, Bombay, and other parts of Hindostan. It is yielded by *C. elongata*, and is readily distinguished by the great length and comparative narrowness of the leaflets. The medicinal uses of senna are too well known to require any notice here. *C. occidentalis* is called *Stinking Weed* about Kingston in Jamaica, and the tops of the plant are commonly applied in all resolutive baths, and is accounted a very powerful ingredient on such occasions. *C. marilandica* or *American Senna* is a shrub, from three to six feet high, common in all parts of the United States south of New York. It has all the properties of the officinal senna, is an efficient and safe cathartic, but is less active.

Cassia (Cathartocarpus) fistula is the *Purging Cassia* or *Pudding-pipe Tree*. It is a large tree forty or fifty feet high, with a trunk of hard, heavy wood. The pods, Fig. 95 F, are a foot or more in length, less than an inch in diameter, and are composed of a woody shell marked with three longitudinal shining bands extending from one end to the other, marking the junction of the valves of the pod. Internally they are divided into numerous cells by thin transverse plates which are covered with a soft black pulp. This pulp is extracted from the pods by first bruising them, then boiling them in water, and afterwards evaporating the decoction; or when the pods are fresh, by opening them at the sutures and removing the pulp by a spatula. Cassia pulp has a sweet mucilaginous taste, is generally laxative, and may be advantageously given in small doses in cases of habitual costiveness, but in large quantities it excites nausea. The fresh leaves of *Cassia alata* bruised and mixed with lime-juice are considered a powerful specific in ringworm. Dr. O'Shaughnessy says he has often tried them with decided advantage. The whole plant is used by the Tamuls as a remedy in poisoned bites, and as a general tonic. *C. auriculata* has in all its parts a powerful astringency; the powder of the dried seeds is introduced into the eye in extreme stages of ophthalmia; and the seeds are used as tonics in the form of electuary. The seeds of *C. tora* ground with sour buttermilk are used in India with excellent effect in itchy eruptions, and the root rubbed to a pulp with lime-juice has almost specific powers in the cure of ringworm. *C. absus* is a shrub common in Egypt and India, and its powdered seeds are used in cases of chronic ophthalmia.

Aloexylon agallochum is a lofty tree sixty feet high, a native of the Molucca islands. The wood is held in high estimation in the East, on account of its fragrant odour as a perfume, for which purpose it is applied to clothes and apartments, and as a cordial medicine in fainting-fits and in cases of paralytic affection. By the Chinese and heathen Moors it was used as incense in their sacrifices, and employed for setting the most precious jewels that are wrought in the East Indies. It was formerly deemed in that part of the world of greater value than gold, and various fables have been invented as to the origin of the tree that yields it. Some have feigned that it grew in Paradise, and that it was conveyed thence by the rivers which overflowed their banks and swept off the trees in their way. Others pretend that it grows on inaccessible mountains, where it is guarded by wild beasts. This is the true *Calambac wood*, which yields *Aloe wood*, or *Lign-aloes*. It is the most resinous of all the woods we are acquainted with; is of a light, spongy texture, very porous, and the pores so filled up

with a soft and fragrant resin, that the whole may be pressed and indented with the fingers like wax, or moulded about by chewing in the mouth like mastich. Laid on the fire, it melts like resin, and burns away in a few moments with a bright flame and a perfumed smell. Its odour, while in the mass, is very fragrant and agreeable, and its taste acrid and bitterish, but very aromatic and pleasant. It is called by the Chinese *Sukhiang*, and is regarded by all Orientals as the most grateful perfume, stimulant, corroborant, cephalic, and cardiac.

The resin known as *Gum Anime* is now pretty well ascertained to be produced by *Hymenæa courbaril*, which is a lofty tree growing in South America. The wood is very hard, receives an excellent polish, and is used by cabinet-makers. Dr. Hamilton says that the resin exudes from the bark, and is also found under the surface of the ground between the principal roots. It is fine, transparent, white, yellowish, or red. It softens in the mouth, adheres to the fingers when in the state of powder, and readily melts with heat, diffusing its agreeable odour in an increased degree. It is more soluble in alcohol than copal, and is also soluble in the volatile and fixed oils. It makes the finest varnish that is known, superior even to the Chinese lac; and for this use it is dissolved in the highest rectified spirits of wine. When burned it gives out a pleasant balsamic odour, and the fumes not only strengthen the head, but all parts of the body affected with cold. The inner bark is an excellent vermifuge in spirit or decoction. The wild bees are fond of building their nests in this tree. The *Copal* of Mexico is supposed to be produced by a species of the same genus. *Trachylobium Martianum* furnishes *Brazilian Copal*; and *Indian Anime* is supplied by *T. Lamarckianum*. From the bark of *Bauhinia racemosa* the natives of the mountains in India make ropes; but though the fibre makes very strong ropes it is not over durable, and rots if kept constantly in water. It is called in India *Maloo creeper*, and Dr. Royle says it is a magnificent climber and hangs in elegant festoons from the tops of lofty trees, which one is almost at a loss to conceive how, from the distance of its roots from the stems, it could ever have ascended. *B. scandens* has the same properties as the preceding. *B. retusa* and *B. emarginata* yield a brown gum. *Amherstia nobilis* is a tree from thirty to forty feet high, a native of the Burmese empire, and first discovered about two miles from the right bank of the river Samen, and twenty-seven miles from the town of Martaban. Dr. Wallich says, when in flower it is "profusely ornamented with pendulous racemes of large vermilion-coloured blossoms, forming superb objects, unequalled in the flora of the East Indies, and not surpassed in magnificence and elegance in any part of the world. The ground was strewed, even at a distance, with its blossoms, which are carried daily as offerings to the images in the adjoining caves. There can be no question that this tree, when in full foliage and blossom, is the most strikingly superb object which can possibly be imagined." The pulp in the pods of *Codarium acutifolium* and *C. obtusifolium* is dry and mealy, and is eaten by the natives of Sierra Leone under the name of Tamarinds. The wood of *Eprua foliata*, called *Wallaba-tree*, is deep-red, frequently variegated with whitish streaks, hard, heavy, shining, and impregnated with an oily resin, which makes it durable. The tree is a native of Guiana, and the inhabitants make handles to their hatchets with it.

Balsam of Copaiva is produced by several species of *Copaifera*. *C. Jacquinii*, an elegant tree with a lofty stem, growing to the height of thirty or forty feet, is a native of Venezuela, and is also found in some of the West India islands, particularly Trinidad and Martinique. This was supposed to be the tree which furnished the original balsam; but according to Hayne, the species from which most of the copaiva of commerce is obtained is *C. multijuga*, growing in the province of Para. Considerable quantities are yielded by *C. guianensis*; and *C. Langdorffii* and *C. coriacea*, both natives of Santo Paulo, are supposed to supply most of what is collected in that province. The balsam is obtained by making deep incisions in the stems of the trees. As it flows from the wound it is clear, colourless, and very thin, but soon acquires a thicker consistence and a yellowish tinge. It is largely collected in the provinces of Para and Maranhão in Brazil; but large quantities are brought from Maracaibo in Venezuela and other parts of the Caribbean Sea, as well as from Angostura on the Orinoco, from Cayenne, Rio Janeiro, and some of the West India islands. Copaiva is a clear transparent liquid, usually of the consistence of olive oil, of a pale-yellow colour, a peculiar, not unpleasant odour, and a bitterish, hot, nauseous taste. It is insoluble in water, but entirely soluble in absolute alcohol, ether, and the fixed and volatile oils. Its essential constituents are volatile oil and resin, with a minute proportion of an acid which appears to be acetic. On exposure to the air it acquires a deeper colour, a thicker consistence, and greater density; and if spread out upon an extended surface, ultimately becomes dry and brittle. It is frequently adulterated, the fixed oils being the most frequent addition, especially castor oil, which, in consequence of its solubility in alcohol, cannot, like the others, be detected by the agency of that fluid. Copaiva is gently stimulant, diuretic, laxative, and in very large doses actively purgative. It produces, when swallowed, a sense of heat in the throat and stomach, and extends an irritant action not only throughout the alimentary canal, but also to the urinary passages, and in fact to all the mucous membranes, for which it has a strong affinity. As a remedy, it has been found most efficient in diseases of the mucous membrane, particularly those of a chronic character. It is excellent in chronic catarrh, chronic dysentery, leucorrhœa, and other diseases of the mucous membrane. The wood of *C. pubiflora* and *bracteata* furnish timber of great toughness, on account of which it is employed for mortar beds, being found to resist the shock of artillery discharges. It is called *Purple Heart*.

Ceratonia siliqua, or the *Carob-tree*, grows abundantly in Northern Africa, in Spain, Italy, and the Levant, where it is called *Algaroba*. The tree grows from twenty to thirty feet high, and produces long, flat, horn-shaped, brown-coloured pods, which contain a thick, mealy, sweetish-tasted fecula, which is nourishing and laxative. In the countries where they grow, the inhabitants eat them in great quantities, and in Egypt a syrup is extracted from them, which is used for preserving other fruits. Singers are said to chew these pods for the purpose of improving their voice; and in Spain and Italy they are largely consumed for feeding horses and mules. Of late years they have been imported rather extensively into this country for the same purpose, under the name of *St. John's Bread* and *Locust Bean*, from the supposition that they were the locusts upon which the Baptist fed when he was in the wilderness. They are also supposed to be

the "husks" of which the prodigal son was obliged to eat. In times of scarcity they have furnished food to the Spanish peasantry, and they were the principal food of the horses of the British army during the Peninsular war. The seeds are said to have been the original earat-weights used by jewellers.

Moringa pterygosperma, is called *Horse-radish Tree*. It is a native of the East Indies and South America, and receives its name from the roots, when young, being scraped and used by the inhabitants of the countries where it grows, as we do horse-radish; both the root and the seeds having the same acrid and pungent taste. The *Oil of Ben* is obtained from the seeds of the preceding, and those of *M. aptera*, also a native of the East Indies, but grown in Egypt, Syria, and Italy, where the oil is extracted from the seeds by cold expression. This oil is inodorous, clear, and nearly colourless, and keeps for years without becoming rancid. It is used for extracting the fragrance of odoriferous flowers, which have not sufficient basis in themselves to fix their scent; such as jasmine, violet, roses, hyacinths, lilies of the valley, tuberoses, jonquils, clove-gilliflowers, and others, which impart their fragrance to expressed oils. The method is to dip some fine-carded cotton-wool in oil of ben; on this spread a thick layer of fresh flowers, above which more cotton, dipped in oil, is placed, and so on, layer of cotton and flowers, till the vessel containing them is full. The vessel must then be made thoroughly air-tight, and set in a water-bath to digest for twenty-four hours, and the oil, having received the odour of the flowers, is expressed from the cotton, and sold by the perfumers as the oily essences of the flowers with which it has been impregnated.

Swartzia.—From *Baphia nitida* the *Camwood* of commerce is obtained. The tree grows on the western coast of Africa, and attains to the height of fifty feet. Of late years this wood has come very much into use as a dyeing stuff, and for that purpose has almost superseded Brazil wood, as it is richer, and gives a finer colour than any of the varieties of these woods. It is not so much affected by alkalies, nor so liable to assume a violet shade; and the yellow colouring-matter, with which it is mixed, gives the red a more lively appearance. Its colouring principle is thought to be identical with santolin. *Erythrophloeum guineense*, a native of Sierra Leone, and other parts of Guinea, is an immense tree, a hundred feet high. It is called *Gregre-tree*, or *Ordeal-tree*, the red juice in which the tree abounds being used as an ordeal by the natives of many parts of Western Africa, as well as of the interior, to detect the innocence or guilt of those who are accused of any crime. The red juice is taken in large draughts, and those who are not sufficiently strong to withstand this ordeal are pronounced guilty, and those who are are considered innocent.

Mimosa.—*Parkia africana*, a large tree, growing on the western coast of Africa, in the kingdoms of Benin and Warce, is called *Nitta Tree*. In Soudan the seeds are roasted as we do coffee, then bruised, and allowed to ferment in water; when they begin to become putrid, they are well washed and pounded, the powder made into cakes, somewhat in the manner of chocolate, and they form an excellent sauce for all kinds of food. The farinaceous matter surrounding the seeds is made into a pleasant drink, and they also make it into a kind of sweetmeat. The pulp of the pods of *P. uniglobosa* is sweet and farinaceous, and eaten by the natives of Africa.

Adenanthera pavonina is a gigantic tree, a hundred feet high, growing in the East Indies, where it forms one of the largest trees, and its timber is much valued on account of its solidity. The seeds are highly polished, of a lively scarlet colour, with a circular streak in the middle on each side. The natives use the powder of the leaves in their ceremonies. The seeds, besides being eaten by the common people, are of great use to jewellers and goldsmiths, for weights, on account of their equality, each of them weighing four grains; they also make a cement, by beating them up with borax and water; of the bruised leaves they make a drink, which they consider good against pains in the loins. In India the wood is employed as a red dye. Several species of *Prosopis* yield fruit which is eatable. The pod of *P. spicigera* is filled with a mealy pulp, which is eaten by the natives of the coast of Coromandel; it is sweet and agreeable, and may be compared to that of the carob. The pulp of the pods of *P. horrida*, *P. dulcis*, *P. siliquastrum*, *P. juliflora*, and *P. torquata*, is eaten by the inhabitants of the several countries where these are found; and the South American species go by the name of *Algaroba*. *Mimosa pudica* is the *Common Humble Plant*, the leaves of which, on the slightest touch, instantly recede, contract, close, and with the footstalk quickly decline downward.

The Gum-bearing *Acacias* are all thorny or prickly trees or shrubs, calculated by nature for a dry and sandy soil, and flourishing in deserts where few other trees will grow. We are told that camels attached to the caravans derive from them their chief sustenance, in many parts of those desolate regions in which Africa abounds. In these situations they have a stunted growth, and present a bare, withered, and uninviting aspect; but in favourable situations, as on the banks of rivers, they are often luxuriant and beautiful. There are several species which produce *Gum Arabic*; among the most important of which are *Acacia vera* and *A. arabica*. The former is a medium-sized tree, which grows in Upper Egypt and Senegal. The latter also grows, not only in Upper and Lower Egypt and Senegal, but in other parts of Africa, in Arabia, and is abundant in Hindostan, where the gum is used for food by the natives. It is from this that the transparent gum arabic, called *Gum-thur*, is obtained; the brown, or common kind, being the produce of the preceding species. The wood is strong, tough, and durable, and makes excellent knees and crooked timber for shipbuilding. The bark is astringent, and is used for tanning leather, and to dye various shades of brown. A decoction of the bark is used as a substitute for soap. *A. senegal* is a small tree, inhabiting the hottest regions of Africa, and said to form vast forests in Senegambia. From it *Gum Senegal* is obtained. Besides these, there are other species which produce gum arabic or varieties of it. *A. Ehrenbergiana*, a shrub six or eight feet high, growing in the deserts of Lybia, Nubia, and Dongola. *A. seyal*, growing in the same countries, and in Upper Egypt and Senegambia. *A. Adansonii*, which is said to supply a portion of gum senegal. *A. tortilis*, a tree sixty feet high, inhabiting Arabia Felix, Nubia, Dongola, and Lybia. *A. Karroo*, a native of the Cape of Good Hope, was formerly considered identical with *A. vera*. *A. decurrens* and *A. floribunda*, natives of Australia, are also said to yield a similar gum. *A. gummifera*, found in Morocco, near Mogadore, and also in the Isle of Bourbon, is a large and lofty tree, and yields the *gum opocarpasum*, the Abyssinian myrrh of Bruce, called *Talleh* by the Arabs of

the desert. This substance occurs in rather large fragments, of uniform texture, and brownish colour, inodorous, with an insipid taste, and mucilaginous. In water it swells, becomes white, and acts like tragacanth. It is chiefly composed of *Bassorine*, which is a principle insoluble in water at any temperature, and is the essential constituent of gum bassora and tragacanth.

Gum arabic is the concrete juice of the various species of acacia we have just referred to. About the middle of November, after the rainy season, which begins early in July, it exudes spontaneously from the trunk and principal branches. In about fifteen days it thickens in the furrow down which it runs, either into a vermicular shape or more commonly assuming the form of round or oval tears, about the size of a pigeon's egg, of different colours, as they belong to the white or red gum tree. About the middle of December the Moors encamp on the borders of the forest, and the harvest lasts for five weeks. The gum is packed in very large sacks of tanned leather, and brought on camels and bullocks to certain ports, where it is sold to the French and English merchants. From Mogador two sorts of gum are exported; one is common gum arabic, the other finer, called *Gum soudan*, brought from Timbuctoo by the caravans. In commerce six varieties of gum are met with. 1. *Turkey Gum*. This is collected in Upper Egypt, Nubia, Kordofan, and Darfur, whence it is taken down the Nile to Alexandria, and a considerable quantity is also brought from Arabia to the same port. It is this variety which the apothecaries generally use, and consists of small, irregular fragments, which are commonly whitish, or slightly tinged with yellow, or reddish yellow, much freer from impurities than other commercial varieties, and contains much of that form of gum arabic which has innumerable minute fissures pervading its substance and impairing its transparency. 2. *Barbary Gum*. This is produced in Barbary, and shipped at Mogador, a port of Morocco, and there are two kinds of it, one from the neighbouring provinces, and the other brought in caravans from Timbuctoo. This may account for the fact that the Barbary gum in part resembles the Turkey, in part the Senegal. When first deposited in warehouses it has a faint smell, and makes a crackling noise, occasioned by the spontaneous rupture of the small masses as they become more dry. 3. *Senegal Gum*. Of this there are two varieties, produced by two different trees, called by the natives "verreck" and "nebucl," the former yielding a white and the latter a red gum. It is usually in roundish or oval unbroken pieces, of various sizes, sometimes whitish, but generally yellowish or reddish, or brownish-red, larger than those of the Turkey gum, less brittle and pulverizable, and breaking with a more conchoidal fracture. 4. *Indian Gum* is in pieces of various size, colour, and quality; some resembling the broken fragments of Turkey gum, though much less chinky; others large, roundish, and tenacious, like the Senegal. Its taste is sweeter than that of the other varieties, and it usually contains portions of a different kind of gum, having the characteristic properties of that known by the name of *Bassora Gum*. This is distinguished by its insolubility in water, with which, however, it unites, swelling up, and forming a soft viscid mass. 5. *Cape Gum* has recently been imported into this country from the Cape of Good Hope, where it is probably collected from *Acacia karroo*, which grows abundantly on the banks of the Gariep

and other parts. It is of a pale yellow colour, in tears or fragments, and is considered of inferior quality. 6. *Australian Gum* has been imported in considerable quantities from South Australia. It is in elongated or globular pieces, rough, and even wrinkled on the surface, and of a violet tint, which distinguishes it from other varieties. It is not entirely soluble in water, to which it imparts less viscosity than ordinary gum arabic.

Gum arabic is said to be highly nutritious. During the whole time of the gum harvest, of the journey, and of the fair, the Moors of the desert live almost entirely upon it, and experience has proved that six ounces is sufficient to support an adult during twenty-four hours; and the Bushman Hottentots, in times of scarcity, support themselves on it for days together. In many cases of disease, its solution may with propriety constitute for a time the exclusive drink and food of the patient. Gum arabic consists essentially of a peculiar proximate principle of plants usually called *gum*, but for which the name of *arabin* has been adopted. This is soluble either in cold or hot water, and forms a viscid solution called mucilage, which, when evaporated, yields the gum unchanged. It is insoluble in alcohol, ether, and the oils; and alcohol precipitates it from its aqueous solution. Used medicinally, gum is a demulcent, and serves, by the viscosity of its solution, to cover and sheath inflamed surfaces. In the arts, it is used for many purposes.

Acacia catechu is a small tree, seldom more than twelve feet in height, a native of the East Indies, growing abundantly in various provinces of Hindostan and in the Burmese empire, and now common in Jamaica. It abounds in astringent matter, and it is from the root and leaves that the drug called *Catechu* is extracted. In India it is called *Kuth*; and Dr. Royle thus describes the mode by which it is obtained:—"In northern India, the 'Kuth' manufacturers move to various parts of the country in different seasons, erect temporary huts in the jungles, fell the trees, and cut the inner wood into small chips. These they put into small earthen pots, arranged in a double row along a mud fire-place; water is then poured in till the whole is covered. After a considerable portion has boiled away, the clear liquor is strained into one of the neighbouring pots, and a fresh supply of material is put in the first. This operation is repeated until the extract in the general receiver is thick enough to be poured into clay moulds, usually of a square form." *Catechu* was formerly called *Terra Japonica*, from an idea that it was an earthy substance obtained from Japan; and its present name signifies "juice of a tree." It is gently tonic and powerfully astringent, and is best adapted for diarrhoea dependent on debility or relaxation of the intestinal exhalants, and passive hemorrhages, particularly that from the uterus. A small piece held in the mouth, and allowed slowly to dissolve, is an excellent remedy in relaxation of the uvula, and irritation of the fauces and troublesome cough which depend upon it. Applied to spongy gums, in the state of powder, it sometimes proves useful; and it has been recommended as a dentifrice in combination with powdered charcoal, Peruvian bark, myrrh, &c. Sprinkled on indolent ulcers, it is occasionally beneficial, and is much used in India for the same purpose, mixed with other ingredients, in the state of an ointment.

Acacia horrida is called at the Cape *Doornboom*, and is a timber tree twenty-five to thirty feet high. The wood is hard, tough, extensively

employed in the interior for building purposes, looks well when varnished, and is therefore adapted for all kinds of common furniture. The colonists generally place the logs for some time in water before using them, in order to render the wood more durable. It furnishes a very good material for wheels, poles, and yokes, and other agricultural purposes; and answers well for turners' work. It is the most common tree in the wastes of South Africa. *A. melanoxyton*, called *Black-wood* or *Light-wood*, is a very hard, close-grained, dark, and richly-veined cabinet wood. This is obtainable in any quantity, and of the largest size requisite for furniture and fittings; and it is said to be darker when grown on the south side of the colony.

The pods of *Castanospermum australe* contain four seeds as large as Spanish chesnuts, which are eaten by the natives about Moreton Bay, and hence called *Moreton Bay Chesnuts*. They have, when roasted, somewhat of the flavour of Spanish chesnuts, and even Europeans who have subsisted on them for two or three days together have found no bad effects from them when roasted. *Brya ebenus* is a small tree about twelve feet high, a native of the West Indies, and called *American Ebony*. The wood is cut and sent to Britain under the name of ebony, and is of a fine greenish-brown colour, receives a good polish, is of a very hard and durable nature, and is much sought after by musical instrument makers. The trunk is seldom above three or four inches in diameter; and the slender branches, being very tough and flexible, are frequently used as riding-switches, and were formerly kept at all the wharves of Kingston in Jamaica to scourge refractory slaves.

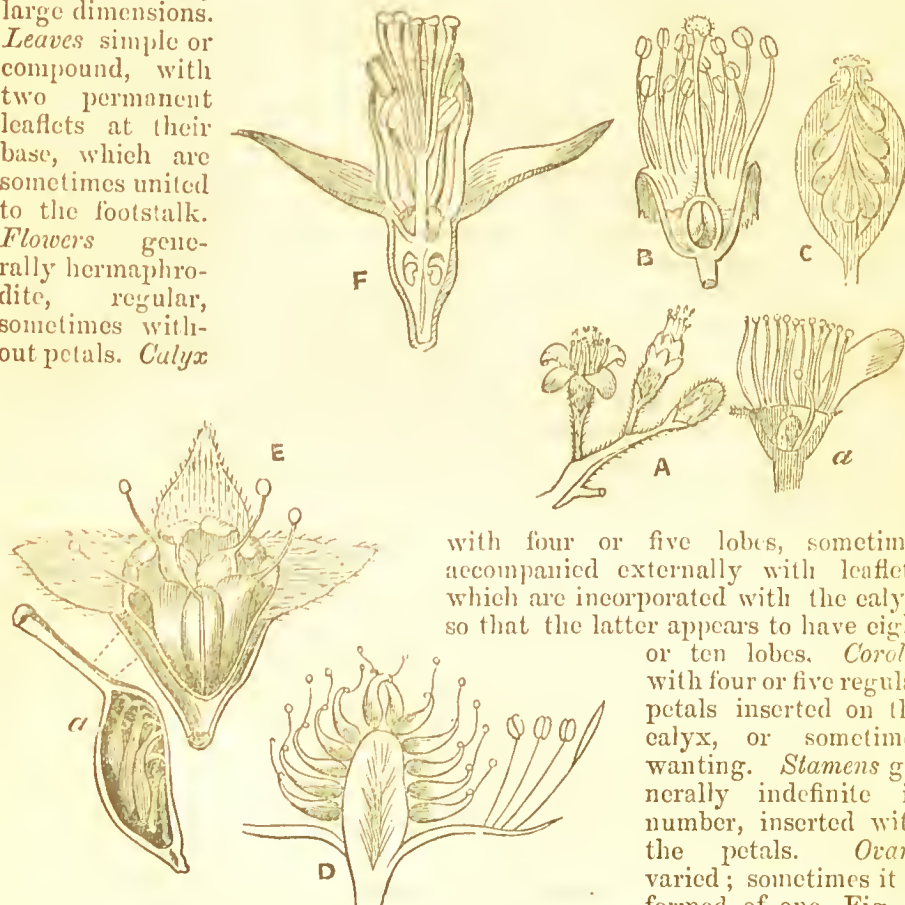


ORDER LXXI.—ROSACEÆ—ROSE BLOOMS.

THIS large family is composed of herbaceous plants, shrubs, or trees, which attain very large dimensions.

Leaves simple or compound, with two permanent leaflets at their base, which are sometimes united to the footstalk.

Flowers generally hermaphrodite, regular, sometimes without petals. *Calyx*



with four or five lobes, sometimes accompanied externally with leaflets, which are incorporated with the calyx, so that the latter appears to have eight or ten lobes. *Corolla* with four or five regular petals inserted on the calyx, or sometimes wanting. *Stamens* generally indefinite in number, inserted with the petals. *Ovary* varied; sometimes it is formed of one, Fig. B, or several carpels entirely free and distinct, Fig. E, and placed in a

Fig. 96. Illustrations of the Tribes.

tubular calyx; sometimes these carpels adhere by their outer side to the calyx; sometimes they are not only united to the calyx, but to each other, Fig. F; and sometimes they are collected into a kind of head upon a common receptacle, Fig. D. Each of these carpels is one-celled, and contains one, two, or a greater number of ovules, the position of which varies. *Style* more or less on one side, and the *Stigma* simple. *Fruit* very varied; sometimes it is a plum, sometimes an apple; sometimes one or more seed-nuts, or one or more opening capsules; sometimes a collection of small drupes forming a head, as in the raspberry; and sometimes an enlarged fleshy

receptacle bearing the seeds on its surface, as in the strawberry. *Seeds* without albumen.

The following tribes have been by some treated as distinct families, but we shall here follow the example of Jussieu, Richard, and some other botanists of note, and include them under one.

SUB-ORDER I.—CHRYSOBALANEE, Fig. A.

Ovary single, free, containing two erect ovules; style filiform, arising nearly from the base of the ovary; flowers more or less irregular; fruit drupaceous.

GENERA AND SYNONYMES.

<i>Chrysobalanus</i> , <i>L.</i>	<i>Hedycera</i> , <i>Schröb.</i>	<i>Couepia</i> , <i>Aubl.</i>	<i>Grangeria</i> , <i>Comm.</i>
<i>Icaco</i> , <i>Pl.</i>	<i>Batheogynæ</i> <i>Benth.</i>	<i>Acioa</i> , <i>Aubl.</i>	<i>Prinsepia</i> , <i>Royle.</i>
<i>Hirtella</i> , <i>L.</i>	<i>Leptobalanus</i> ,	<i>Dulacia</i> , <i>Neck.</i>	<i>Cyenia</i> , <i>Lindl.</i>
<i>Cosmibuena</i> <i>R & P</i>	[<i>Benth.</i>	<i>Parinarium</i> , <i>Juss.</i>	<i>Lecostemon</i> , <i>M & S.</i>
<i>Causea</i> , <i>Scop.</i>	<i>Microdesmia</i> , <i>Benth.</i>	<i>Parinari</i> , <i>Aubl.</i>	<i>Trilepisium</i> , <i>Thou.</i>
<i>Balanium</i> , <i>Desv.</i>	<i>Hymenopus</i> , <i>Benth.</i>	<i>Dugortia</i> , <i>Scop.</i>	<i>Stylobasium</i> , <i>Desf.</i>
<i>Braya</i> , <i>Fl. Fl.</i>	<i>Moquilea</i> , <i>M. & Z.</i>	<i>Petrocarya</i> <i>Schreb.</i>	<i>Macrostigma</i> ,
<i>Licania</i> , <i>Aubl.</i>	<i>Acia</i> , <i>W.</i>	<i>Thelyra</i> , <i>Thouars.</i>	[<i>Hook.</i>

SUB-ORDER II.—AMYGDALEE, Fig. B.

Calyx inferior, deciduous. Ovary single, free, superior, containing two collateral ovules. Style filiform, terminal. Flowers regular. Fruit drupaceous, with one or two seeds suspended from the top of the cell.

GENERA AND SYNONYMES.

<i>Pygeum</i> , <i>Gärtn.</i>	<i>Polystorthia</i> , <i>Bl.</i>	<i>Persica</i> , <i>T.</i>	<i>Armeniaca</i> , <i>T.</i>
<i>Polydonta</i> , <i>Bl.</i>	<i>Amygdalus</i> , <i>L.</i>	<i>Prunus</i> , <i>L.</i>	<i>Cerasus</i> , <i>Juss.</i>

SUB-ORDER III.—ROSEÆ, Fig. C.

Calyx inferior, and more or less permanent, free. Ovaries generally numerous, inserted in a whorl in the base of the calyx, or irregularly in its tube; rarely almost definite or solitary. Ovule solitary; rarely double or numerous. Carp. is free from the tube of the calyx, or merely seated on it. Leaflets adhering to the base of the leaf-stalks.

TRIBE 1. *Neuradæ*.—Calyx five-lobed, with a short tube adherent to the ovary, and valvate in æstivation. Petals five. Carpels ten, connected into a ten-celled capsule, which is depressed at the apex. Seeds pendulous.

GENERA AND SYNONYME.

<i>Neurada</i> , <i>B. Juss.</i>	<i>Amoreuxia</i> , <i>M & G.</i>
<i>Gri-lum</i> , <i>L.</i>	<i>Euryanthe</i> , <i>Schlecht.</i>

TRIBE 2. *Quillajæ*.—Calyx valvate in æstivation; tube herbaceous. Ovaries five, united at the base; one-celled, containing numerous erect ovules. Seeds winged at the apex.

GENERA AND SYNONYMES.

<i>Kugeneckia</i> , <i>R. & P.</i>	<i>Smegmadermos</i> , <i>R. & P.</i>	<i>Lindleya</i> , <i>Kunth.</i>
<i>Lydea</i> , <i>Mol.</i>	[<i>P.</i>	<i>Euphronia</i> , <i>M. & Z.</i>
<i>Quillaja</i> , <i>Mol.</i>	<i>Vauquelinia</i> , <i>Corr.</i>	

TRIBE 3. *Spiræidæ*.—Calyx with the lobes imbricate in æstivation; tube herbaceous. Ovaries superior; often five arranged in a whorl and free from the calyx. Fruit a ring of distinct foliicles not inclosed within the tube of the calyx. Fig. 96, E.

GENERA AND SYNONYMES.

<i>Kerria</i> , DC.	„ <i>Spiræaria</i> , Ser.	<i>Neillia</i> , Don.	<i>Brayera</i> , Kunth.
<i>Spiræa</i> , L.	<i>Schizonotus</i> ,	<i>Gillenina</i> , Mön.	<i>Hagenia</i> , W.
<i>Ulmaria</i> , T.	[<i>Lindl.</i>	<i>Nuttalia</i> , T. & G.	<i>Cusso</i> , Brucc.
<i>Filipendula</i> , T.	<i>Sorbaria</i> , Ser.	<i>Rhodotypos</i> , Zucc.	<i>Banksia</i> , Brucc.
<i>Barba Capræ</i> , T.	<i>Aruncus</i> , Ser.	<i>Stephanandra</i> , Zucc.	

TRIBE 4. *Potentillidæ*.—Calyx with four or five lobes, often with small leaflets on the outside of them. Tube of the calyx herbaceous, short, nearly flat, not encircling the fruit. Fruit a collection of seed-nuts, or small drupes, arranged upon a common receptacle, Fig. 96, D.

GENERA AND SYNONYMES.

<i>Dalibarda</i> , L.	<i>Tormentilla</i> , T.	<i>Purshia</i> , DC.	<i>Oreocœum</i> , Ser.
<i>Rubus</i> , L.	<i>Argentina</i> , Blackw.	<i>Tigarea</i> , Pursh.	<i>Fallgen</i> , Endl.
? <i>Cylactis</i> , Raf.	<i>Triethothalamus</i> ,	<i>Kunzen</i> , Sp.	<i>Geum</i> , L.
<i>Fragaria</i> , L.	[<i>Lehm.</i>	<i>Cercocarpus</i> , Knth.	<i>Stilipus</i> , Raf.
<i>Duchesnea</i> , Sm.	<i>Boottia</i> , Bigel.	<i>Waldsteinia</i> , W.	<i>Cowanina</i> , Dow.
<i>Comarum</i> , L.	<i>Horkelia</i> , Ch. & S.	<i>Comaropsis</i> , Rich.	<i>Greggia</i> , Engelm.
<i>Potentilla</i> , L.	<i>Chamaerhodos</i> , Bnge	<i>Sieversia</i> , W.	<i>Coluria</i> , R.Br.
<i>Quinquefolium</i> , T.	<i>Dryadanthè</i> , Endl.	<i>Adamsia</i> , Fisch.	<i>Laxmannia</i> , Fisch.
<i>Pentaphylloides</i> T.	<i>Sibbaldia</i> , L.	<i>Buehhavea</i> , Rehb.	<i>Dryas</i> , L.

TRIBE 5. *Sanguisorbiæ*.—Calyx with three to five lobes. Petals either wanting or rarely five. Seed-nuts enclosed within the dry tube of the calyx, which is contracted at the mouth.

GENERA AND SYNONYMES.

<i>Agrimonia</i> , T.	<i>Acœna</i> , Vahl.	<i>Pimpinella</i> , Ad.	<i>Cliffortia</i> , L.
<i>Aremonia</i> , Neek.	<i>Ancistrum</i> , Frst.	<i>Beneomia</i> , Webb.	<i>Morilandia</i> , Neck.
<i>Spallanzania</i> Poll	<i>Ptilochæta</i> , Turcz.	<i>Leucosidia</i> , E. & Z.	<i>Monographidium</i> ,
<i>Alechemilla</i> , T.	<i>Sanguisorba</i> , L.	<i>Tetraglochin</i> , Pöpp.	[<i>Presl.</i>
<i>Aphanes</i> , L.	<i>Pimpinella</i> , T.	<i>Polylepis</i> , R. & P	<i>Poteridium</i> , Spach.
<i>Adenostoma</i> , H. & A.	<i>Poterium</i> , L.	<i>Margyricarpus</i> R & P	<i>Sarcopoterium</i> Spach

TRIBE 6. *Rosidæ*.—Tube of the calyx ventricose, contracted at the mouth, and fleshy. Seed-nuts numerous, hairy, each terminated by a long persistent style, and inclosed within the fleshy tube of the calyx, Fig. 96, C.

GENERA AND SYNONYMES.

<i>Rosa</i> , T.
<i>Hulthemia</i> , Dumort.
<i>Rhodopsis</i> , Ledeb.
<i>Lowea</i> , Lindl.

SUB-ORDER III.—CALYCANTHÆÆ.

Calyx turbinate at the base, with a fleshy tube. Lobes of the calyx and petals numerous, and confounded together. Carpels distinct at the base of the calyx, each containing two ovules, placed one above the other and ascending. Fruit enveloped by the calyx.

GENERA AND SYNONYMES.

<i>Chimonanthus</i> , Lindl.	<i>Calycanthus</i> , L.	„ <i>Beurreria</i> , Ehret
<i>Meratia</i> , Nees.	<i>Büttneria</i> , Duh.	<i>Pompadoura</i> , Bouch.

SUB-ORDER IV.—POMEÆ.—Fig. F.

Fruit consisting of several united one-celled carpels, adhering by their back to the inside of the calyx-tube, and forming an inferior, one to five-celled apple, the cell lined with a cartilaginous or bony substance, each containing one or more ascending seeds.

GENERA AND SYNONYMES.

Cydonia, T.	„ Aria, DC.	Osteomeles, Lindl.	Hesperomeles Lindl.
Chaenomeles Lindl.	Torninaria, DC.	Mespilus, Lindl.	Eriobotrya, Lindl.
Pyrus, Lindl.	Eriolobus, DC.	Mespilophora,	Nägelia, Lindl.
Pyrophorum Neck.	Sorbus, L.	[Neck.	Photinia, Lindl.
Apyrophorum,	Aucuparia, Medik.	Amelanchier Medik.	Myriomeles, Lindl.
[Neck.	Adenorhachis DC.	Aronia, Pers.	Chamæmeles, Lindl.
Lazarulus, Medik.	Aronia, Pers.	Petromeles, Jacq.	Raphiolepis, Lindl.
Halmia, Medik.	Chamæmespilus,	Peraphyllum, Nutt.	Cratægus, L.
Malus, T.	[DC.	Cotoneaster, Medik.	Stranvæsia, Lindl.

GEOGRAPHICAL DISTRIBUTION.—This extensive family is pretty generally distributed over the surface of the globe, but most frequently in the north temperate regions, both of the Old and the New World; and few are met with between the tropics.

PROPERTIES AND USES.—This family supplies some of our most beautiful flowering trees, shrubs, and herbs, and some of our most delicious and useful fruits; but, notwithstanding these attractions, the great majority of them furnish, from their leaves, blossoms, and even seeds, one of the most subtle and powerful vegetable poisons known. This deleterious principle is prussic acid, which, although so poisonous in a concentrated form, rarely exists in such proportion to the sugar, mucilage, and other innocuous substances, with which it is naturally combined, as to be in any degree injurious. Hence bitter almonds, peach and plum stones, and cherry-laurel leaves, have been favourite ingredients with cooks and confectioners to give a pleasant flavour to custards, puddings, and jellies; and several of our most excellent liqueurs, such as noyau, ratafia, and maraschino, owe their flavour to this subtle poison. Astringency is a prominent feature in the whole family, and particularly so in the sub-class Rosæ. But, besides these, some contain a large quantity of volatile and fixed oils, which are largely used in medicine and the arts.

Chrysobalanæ.—The fruit of the greater part of the plants of this sub-class are eatable, though by no means very palatable, being extremely dry and farinaceous. *Chrysobalanus icaco* is a native of South America and the West Indies, and is called *icaco*, or *Cocoa Plum*. The fruit is about the size and shape of a plum, varying very much in colour, being white, yellow, red, but most commonly purple, and usually covered with a kind of bloom; the skin is thin, and the pulp white, adhering firmly to the stone, with a sweet taste, and some austerity, but not unpleasant, and is eaten both raw and preserved. In Guiana the natives strip the bark from *Moquila guianensis* and use it in baking their earthenware. The fruit of *Parinarium excelsum* is brought to the market of Freetown, in Sierra Leone, under the name of *Grey Plum*. They are about the size of an Imperatrice Plum, with a coarse skin, of a greyish colour; the pulp is dry and farinaceous, and, owing to the size of the stone, is small in bulk. They are greedily eaten by the negroes. The

fruit of *P. macrophyllum*, also a native of Sierra Leone, is called *Ginger-bread Plum*, and is also eaten by the natives. The seeds of *Prinsepia utilis* yield an abundance of useful oil.

Amygdalæ—In this sub-class we have the Almond, Peach, Nectarine, Apricot, Plum, and Cherry.

Almonds, the fruit of *Amygdalus communis*, are produced throughout the whole of the south of Europe, Syria, Persia, and Northern Africa, but our supplies are obtained from Spain and the South of France. They are distinguished into *Bitter* and *Sweet* almonds, the former being the produce of a variety of the common almond, called *Amygdalus communis amara*, and the latter of *A. c. dulcis*. There are two varieties of the sweet almond, distinguished in commerce by the names of *Jordan* and *Valentia* almonds; the former are imported from Malaga, and are longer, narrower, more pointed, and more highly esteemed than the latter; and the latter are brought from Valentia. Bitter almonds are obtained chiefly from Morocco and are exported from Mogador. The use of sweet almonds is well-known, the kernels being used, either green or ripe, as an article in the dessert. They are much used in cookery, confectionary, perfumery, and medicine. In domestic economy, they should always be used in preference to bitter almonds, as the kernels do not contain any hydrocyanic or prussic acid, although it is found in the leaves, flowers, and bark of the tree. When young and green, they are preserved in sugar, like green apricots. They supply the almond oil; and the farinaceous matter which is left after the oil is expressed forms the *Pâté d'Amandes* of the perfumers. The oil is employed in the arts for the same purposes as olive oil; and, when used medicinally, it is emollient, nutritive, and laxative. It forms the basis of *Kubdyor*, *Macassar Oil*, *Gowland's Lotion*, and many other articles of that nature sold by perfumers. Bitter almonds are injurious to animal life on account of the great quantity of hydrocyanic acid they contain, and are consequently seldom used in domestic economy, except to give flavour to confectionary, and even then they should be used with great caution. A single drop of the *Essential Oil of Bitter Almonds* is sufficient to destroy a bird, and four drops have caused the death of a middle-sized dog. In the environs of Alicante the husks of almonds are ground to a powder, and enter into the composition of common soap, the great quantity of alkaline principle they contain rendering them suitable for this purpose; and it is said that in some parts of the south of France, where they are extensively grown, horses and mules are fed on the green or dry husks; but to prevent any evil consequences, as the animals devour them with great avidity, they are mixed with chopped straw or oats.

The *Peach* is very nearly allied to the almond, and, by botanists generally, is included in the same genus under the name of *Amygdalus persica*. So nearly are they related, that there are instances of hybrids being raised by impregnating the almond with the pollen of the peach, which produced almonds covered with pulpy flesh, which, when ripe, were eatable like a peach. The peach is supposed to have been brought originally from Persia, but is now naturalized over the whole of the temperate zone. It is very largely grown in America, where immense orchards of several thousands of peach trees are to be found. These plantations are formed by merely dropping the peach stones into holes in the ground, and leaving nature to

do the rest of the work. Thousands of acres in New Jersey, Delaware, and Maryland are devoted to this crop; and many growers have orchards of from 10,000 to 20,000 trees, producing as many bushels of fruit. With such quantities of fruit, it will naturally be asked—to what uses is it all applied? Large quantities are used in pies and pastry; a great quantity of it is annually distilled for *peach brandy*; but the greatest part of the crop is dried in spent ovens and drying-houses, and sent to market. The drying is performed on a small scale in spent ovens; on a large scale in small drying-houses, heated by a stove and fitted-up with ventilated drawers. These drawers, the bottoms of which are formed of laths, or narrow strips, sufficiently open to allow the air to circulate through them, are filled with peaches cut in halves. They are cut into two without being peeled, the stone taken out, and the two halves placed in a single layer with the skin downwards. But in the Southern States they are merely dried on boards and laid in the sun. In those districts where the peach is grown so extensively, hogs are fattened on the refuse of the orchard and distillery. Peach leaves bruised in water and distilled make the *peach water* so much esteemed by many for flavouring articles of cookery. The kernels are employed in America, by distillers, in the preparation of liqueurs, and by confectioners to give flavour to their pastry and dishes. The *Nectarine* is only a variety of the peach, and is distinguished by the name of *Amygdalus persica levis*, the only difference being in its having a smooth skin; and there can be no doubt that it originated in a mere freak of nature, as we have seen instances of nectarines being produced on the branch of a peach tree without having been budded.

Under the generic name *Prunus*, Linnæus included the Apricot, the Plum, and Cherry; but some botanists have separated them into as many genera, without any sufficient ground for doing so. The *Apricot* is *Prunus Armeniaca* of Linnæus, or *Armeniaca vulgaris* of some authors. It has been cultivated in this country since the time of Henry the Eighth, whose gardener, named Wolfe, a Roman Catholic priest, introduced it from Italy. In this climate most of its varieties require the protection of a wall or of a fruit-house; but there are some which, in the southern counties, will bear and ripen fruit as standards. In the East, the fruit is dried in the same way as figs are, and used as an article of food.

The *Plum* is *Prunus domestica*, and from it all our cultivated varieties of plums have been derived. In its wild state it is found in Great Britain, in hedges, and all throughout Europe, but its native country is supposed to be Asia Minor, and it has been introduced to Europe through Greece, and then to Italy. There is every reason to believe that it has been naturalized in this country. The fruit of the plum requires no notice here as to its uses, but they may be summed up in the remark, that they are generally employed in the dessert, in pies, tarts, preserves and sweetmeats. Used medicinally, the dried fruit, or, as they are called, *Prunes*, are laxative and nutritious, and, stewed with water, form an excellent diet in cases of costiveness, especially during convalescence from fevers and inflammatory diseases. As they impart their laxative property to water, they are a pleasant and useful addition to purgative decoctions. Taken too largely in a debilitated state of the digestive organs, they are apt to occasion flatulence, and a griping pain in the stomach and bowels. The dried fruit of the plum

is brought from the South of France, generally from the ports of Bordeaux and Marseilles; and there are several varieties which are used for this purpose. In the district of Tours, the finest prunes are made of the *Prune d'Agen* and *St. Catherine plums*; but the best of all French-dried plums are made in Provence, of the *Perdrigon blanc*, *Perdrigon violette*, and *Prune d'Ast*; the two first are those which form the *Pruneaux de Brignole* or *Brignoles*, so called from being made at Brignole, a small town in Provence. The manner in which these dried plums are made is as follows. When the fruit is so ripe that it will fall by slightly shaking the tree, they are gathered and spread out separately on frames, or sieves made of laths or wicker-work, for several days, exposed to the sun till they become quite soft. They are afterwards put into a spent oven, shut up quite close for twenty-four hours, and then taken out. The oven is re-heated, rather warmer than it was before, and the plums are put in again. The next day they are taken out and turned by slightly shaking the sieve. The oven is again heated, but one fourth hotter than it was before, and they are put in a third time, and, after remaining twenty-four hours, they are taken out and left to get quite cold. They are then rounded, an operation which is performed by turning the stone in the plum without breaking the skin, and pressing the two ends together between the thumb and finger. They are again put on the sieves, which are placed in an oven from which the bread has been just drawn. The door of the oven is closed, and the crevices are stopped round with clay or dry grass. An hour afterwards the plums are taken out, and the oven is again shut, with a cup of water in it, for about two hours. When the water is so warm as just to be able to bear the finger in it, the prunes are again placed in the oven, and left there for twenty-four hours, when the operation is finished, and they are put loosely into small, long, and rather deep boxes for sale. The common sorts are gathered by shaking the trees, but the finer kinds, for making French plums, must be gathered in the morning, before the rising of the sun, by taking hold of the stalk between the thumb and finger, without touching the fruit, and laid gently on a bed of vine leaves in a basket. When the baskets are filled, without the plums touching each other, they are removed to the fruit room, where they are left for two or three days, exposed to the sun and air; after which the same process is employed as for the others. These are the fine, fleshy plums which are used for dessert; but the common kinds, made from the *petit Damas*, have a sour taste, and act as a laxative. In Germany, the long, egg-shaped varieties of the plum, called *Quetsche*, are dried very extensively, and used during the winter months. They also distil a kind of brandy from the fruit, which is largely consumed in some districts, and is the only spirit the inhabitants have to use. The wood of the plum is used in turnery, cabinet-work, and in making musical instruments.

The *Black-thorn*, or *Sloe*, is *Prunus spinosa*, a small shrub, growing wild in the hedge-rows, thickets, and on the commons of Great Britain. The fruit is very acid until it has been ameliorated by frost, and is used in home-made wines to communicate the colour and roughness of Port. They make an excellent preserve, which is much relished by children on the continent. The inspissated juice forms *German acacia*, under the name of *acacia nostras*. The young leaves have been used as a substitute for tea,

and for adulterating the Chinese tea, and is said to be the best substitute that has yet been tried. Sloes are recommended as a styptic medicine, in diarrhoeas, hemorrhages, and as gargles for swellings of the tonsils and uvula. Dr. Cullen considered them the most powerful of acid fruits. The flowers, with their calyxes, in the dose of an ounce infused in water, are moderately purgative. The bark has a bitter and astringent taste, and possesses a certain tonic action, for which reason some authors have classed it among the substitutes for Peruvian bark. *Prunus insititia* is the *Bullace Plum*, also found wild in our hedges and thickets, where it furnishes for the country people, in some districts, an abundance of very good fruit for pies and puddings. Preserved with sugar they are very useful for family use; and, after being ameliorated by frost, they are not at all disagreeable in flavour. An infusion of the flowers, sweetened with sugar, is a mild cathartic.

The *Cherries* cultivated in gardens and orchards have originated from two distinct species. Those which are called "Hearts" and "Bigarreaus" are varieties of *Cerasus avium*, known by the names of *Merry*, *Mazzard*, *Corone*, and *Gean*; and the *Dukes*, *Morellos*, and *Kentish* are varieties of *C. vulgaris*. Both are found wild in the woods of Britain. The fruit of the cherry is held in high estimation wherever it is cultivated, either to be eaten raw, or to be cooked in pies or puddings; sometimes cherries are steeped in brandy and called *brandy cherries*. The juice of the fruit is mixed with brandy, and called *cherry brandy*. The celebrated *Kirschwasser* of Germany is a liqueur distilled from the fruit of the cherry, and is thus made:—When the cherries have arrived at maturity, they are gathered and the stalks separated from them. They are then pounded in a wooden vessel, without breaking the stones, and left till they ferment. When fermentation has begun, the liquor is stirred two or three times a day, and as soon as the fermentation has ceased, it is put into close barrels to prevent the acetous fermentation. The kernels are then broken and thrown into the liquor, and the whole is distilled together. *Maraschino* is an Italian liqueur, made at Zara, in Dalmatia, from a small black gean, which is fermented with honey, afterwards with the leaves and kernels of the fruit; then distilled and sweetened with sugar. The gum of the cherry was long considered somewhat analogous to gum arabic; but it has been ascertained that, while the principle of gum arabic is *arabin*, that of cherry gum is *cerasin*, and, unlike arabin, is not soluble in cold water. The shade trees of Germany are chiefly formed of cherry trees. Mr. London states that, especially in Germany and Switzerland, the cherry is much used as a roadside tree. In some countries the road passes for miles together through an avenue of cherry trees. In Moravia, the road from Brunn to Olmutz passes through such an avenue, extending upwards of sixty miles in length; and, in the autumn of 1828, he travelled for several days through one continuous avenue, from Strasbourg, by a circuitous route, to Munich. All persons are allowed to partake of the cherries, on condition of not injuring the trees; but the main crop of the cherries, when ripe, is gathered by the respective proprietors of the land on which it grows; and when they are anxious to protect the crop of any particular tree, it is, as it were, tabooed,—that is, a wisp of straw is tied to a particular part of one of the branches. The wood of the wild cherry is firm, strong, close-grained, and of a reddish

colour. It is soft, easily worked, and takes a fine polish; is much sought after by cabinet-makers, turners, and musical instrument-makers, more particularly in France, where mahogany is much less common than in Britain.

Cerasus serotina W. is a native of the Northern States of America, where it is called *Choke Cherry*. Its fruit is sweet, astringent, and bitter, and is employed to impart flavour to spirituous liquors. Its wood is highly valued by cabinet-makers for its compactness, fine grain, and light-red tint, which deepens with age; and it takes a good polish. The inner bark is used in medicine, and particularly that of the roots, as being most active. In America it is regarded as a valuable remedy, uniting with a tonic power the property of calming irritation and diminishing nervous excitability; and it is admirably adapted to the treatment of diseases in which a debilitated condition of the stomach or of the system is united with general or local irritation. When largely taken, it is said to reduce the action of the heart. *Cerasus lauro-cerasus* is called *Cherry Laurel* or *Common Laurel*, and is a native of Asia Minor. The leaves have a bitter taste, resembling that of the bitter almond, and are used in domestic economy for flavouring custards, puddings, blanc-mange, for which purpose they are more safe than essences or oils; but even they, if used too largely, are also poisonous, from the quantity of hydrocyanic acid they contain. *C. puddum*, a native of Nepaul, has a fruit like that of the common cherry, and is very refreshing, but not very sweet. *C. padus*, the *Bird-cherry*, or *Hug-berry*, is common in some parts of Britain, and the fruit is nauseous; but infused in gin or whiskey, it greatly improves them, and is only surpassed by an infusion of peach leaves. The leaves of *C. capricida* contain such a large quantity of prussic acid as to kill goats which eat them. It is a native of Nepaul. The Portugal Laurel is *C. lusitanica*.

Rosææ.—SPIRÆIDÆ.—The *Meadow-Sweet*, or *Queen of the Meadow*, which adorns our moist meadows, river banks, and ditch sides, and perfumes the air with its sweet, hawthorn-like scent, is *Spiræa ulmaria*. The flowers, infused in boiling water, give a very fine flavour, which rises in distillation, and the whole of the green parts of the plant partake of an aromatic flavour when rubbed or chewed. *S. filipendula*, which is called *Dropwort*, is very astringent in all its parts, and was formerly used in medicine. *S. tomentosa*, a native of North America, is called *hardhack*, and is used in medicine as a tonic and astringent. The whole plant is bitter, and, in consequence of its tonic powers, it is peculiarly adapted to cases of debility. *Gillenia trifoliata* and *G. stipulata* are known in America as *Indian Physic* and *American Ipecacuanha*. They are herbaceous perennials, and the bark of the roots of both has a strong, but not disagreeable, bitter taste. The bitterness is extracted by boiling water, which acquires a wine-red colour. It is a mild and efficient emetic, and, like most other substances belonging to the same class, occasionally acts on the bowels. In very small doses, it has been thought to exercise a tonic influence.

POTENTILLIDÆ.—In this tribe we meet with some very popular plants, among which are the bramble or blackberry, raspberry, strawberry, and dewberry. The *Bramble* or *Blackberry* is common in all the hedge rows, woods, and copses of this country, and few there are to whom the gathering of the fruit does not call up some pleasing recollections. There are several

species of *Rubus* natives of Britain. *R. fruticosus* is the *Common Bramble*, the fruit of which, so abundant in our hedge-rows in autumn, is well-known; and, when preserved, makes an excellent jam of a very rich flavour. It also furnishes an excellent and wholesome home-made wine, either alone or mixed with currants. The green twigs dye wool and silk black. Silkworms eat the leaves, which are astringent; and a decoction of them may be used in gargles. The stem, leaves, and unripe fruit, when bruised together and applied externally, have been regarded as a cure for ringworm. The *Dewberry* is *R. cæsius*, a native of the waysides and hedges of Britain. The fruit is very sweet and agreeable, large, and of a bluish colour, with a glaucous bloom over it, which has a dew-like appearance, giving rise to the popular name. It also makes an excellent wine. The fruit of *R. villosus* and *R. trivialis* are much used as food in North America, and a jelly made from them is in great esteem as an article of diet, and even as a remedy in dysenteric affections. Their roots are officinal, and are used as tonics and strong astringents. Given in the form of decoction, they are acceptable to the stomach without being disagreeable to the taste, and may be employed with great advantage in cases of diarrhœa from relaxation of the bowels, whether in children or adults. *R. saxatilis* grows plentifully in the northern parts of this country, where they are sometimes called *Roebuck-berries*. The fruit is eatable, and the Russians ferment them with honey and extract a powerful spirit from them. *R. articus* is found on the mountains of the island of Mull. The fruit is very agreeable; and Linnæus states that, during his tour in Lapland, he reaped great benefit from it, as it recruited his spirits, when almost sinking with hunger and fatigue, by the vinous nectar of its berries. He says that the principal inhabitants in Norland make a syrup, a wine, and a jelly from these berries, which they partly consume themselves, and partly send to their friends at Stockholm as a dainty of the rarest and most delicious kind; and he adds, of all the wild berries, this holds the first rank. The *Cloud-berry* or *Mountain Bramble* is plentiful on the mountains of Scotland, the north of England, and Wales, and may be found throughout the whole northern region both of the Old and the New World. It flowers almost immediately after the snows have passed away in June, and the berries are scarcely well-ripened in August before the plant is again wrapped in its winter covering. The Highlanders of Scotland and the Laplanders esteem it one of the most grateful and useful fruits, especially on account of its long duration. Its taste is moderately acid and mucilaginous, with something of the flavour of tamarinds. They are held to be an excellent antiscorbutic. The Norwegians pack them in wooden vessels and send them to Stockholm, where they are served up in desserts or made into tarts. The Laplanders bruise and eat them with the milk of the reindeer. Dr. Neill says they are the most grateful kind of fruit gathered by the Scotch Highlanders; and, on the sides and at the foot of mountains, it may be collected for several months in succession. The *Raspberry* also grows wild in Britain, and is the *Rubus idæus* of botanists. Who does not know the domestic uses to which the raspberry is applied? The fruit is fragrant, sub-acid, and cooling, and allays heat and thirst. Raspberry syrup is next to that of the strawberry in dissolving the tartar of the teeth, as, like that fruit, it does not undergo the acetous fermentation in the stomach; and it is recommended to gouty and rheumatic patients.

The varieties of *Strawberry*, as they are now cultivated in gardens, have originated from several distinct species of *Fragaria*. The little *Alpine* or *Wood Strawberry* is the fruit of *F. vesca*, and may be gathered in woods, on shady banks, and by road sides, during the summer months, where its little coral-like and fragrant berries may sometimes be obtained in great plenty, affording a pleasant and grateful rustic dessert. The *Hautbois* and its varieties are *F. elatior*, and may sometimes be met with in groves in the South of England, but rarely. It is a native of North America. All those varieties of the strawberry, called *Scarlets*, which were much cultivated some years ago, but now seldom seen, of which that known by the name of *Roseberry* is one, belong to *F. virginiana*. Those old favourites, *Keens's Seedling*, and *Old Pine*, or *Carolina*, are varieties of *F. grandiflora*, a native of Surinam; and to the same belong the more recent *Myatt's British Queen*, and all those which come under the name of *Pine Strawberries*. *F. chilensis* furnished several varieties, which were in cultivation some years ago, but they have all given place to more modern and better sorts. The use of the strawberry is so familiar to everybody, that we need not remark upon it here; but we would observe that it is particularly safe and wholesome. It consists almost entirely of matter which is soluble in the stomach, and which, neither when eaten nor laid together in a heap, ever undergoes the acetous fermentation; hence it is very nourishing, and may safely be eaten in quantity. In addition to its grateful flavour, the subacid juice has a cooling quality, particularly acceptable in summer. Eaten, either alone or with sugar and cream, there are few constitutions with which strawberries, even when taken in large quantities, do not agree. They dissolve the tartarous encrustations of the teeth, promote perspiration, and persons afflicted with gout have found relief from using them very largely. The bark of the root is astringent.

The roots of *Comarum palustre*, or *Marsh Cinquefoil*, dye wool of a dirty red colour, and have astringency enough, with other plants of this family, to tan leather. In Scotland they are called *Cow-berries*. The *Cinquefoils* are a numerous genus, numbering nearly two hundred species; but, with the exception of *Potentilla reptans*, or *Creeping Cinquefoil*, none of them are remarkable for their products or properties. The root of this plant has a bitterish, styptic, slightly sweetish taste, and was formerly used in diarrhoea, and other complaints for which astringents are usually prescribed. *Tormentilla erecta* is a plentiful plant in barren pastures and heaths. Its root has a slight aromatic odour, and a very astringent taste, and is one of the most agreeable and efficacious of our indigenous aromatic astringents, and may be employed with good effect in all cases where medicines of this class are proper. In the Western Isles of Scotland, and in the Orkneys, they are used for tanning leather, for which purpose they are superior even to oak bark. They are at first boiled in water, and the leather is then steeped in the cold liquor. They contain also a red colouring principle, soluble in alcohol, but insoluble in water. *Geum urbanum* grows abundantly in woods and hedges in Britain, and is called *Avens*, or *Herb Bennet*. Its roots have a mildly astringent, aromatic taste, somewhat like cloves, and hence the plant has been named *Caryophyllata*. Gathered in spring, and put fresh into ale, they give it a pleasant flavour, and prevent it turning sour. It has been used as tonic and astringent, and is esteemed

a good stomachic. The root of *Water Avena* (*G. rivale*) is tonic and powerfully astringent, and is beneficial in passive hemorrhages and diarrhœa. It is much used by the inhabitants of the eastern states of North America, as a popular remedy in pulmonary consumption, simple dyspepsia, and diseases of the bowels, consequent on disorder of the stomach.

SANGUISORBEÆ.—The *Common Agrimony* (*Agrimonia eupatoria*), which is found on the borders of fields in Britain, has long been used to make an herb-tea. It is slightly bitter, aromatic, and astringent. Both herb and root have been employed. The former has a weak, but agreeable aromatic odour, and a rough, bitterish, somewhat aromatic taste; the root has similar properties, but its taste is more bitter and astringent. A volatile oil may be obtained from the plant by distillation. Agrimony is a mild corroborant and astringent. The herb has been employed in relaxed conditions of disease, as in passive hemorrhages and chronic affections of the mucous membranes. In decoction, it was formerly used as an astringent for a gargle, and in diarrhœa and leucorrhœa. The Indians of North America and the Canadians are said to employ the root with advantage in burning fevers. The plant will dye wool of a nankin-yellow colour, and may also be employed in the dressing of leather. *Alechmilla vulgaris*, or *Lady's Mantle*, is also astringent. The whole plant has an astringent, bitterish taste, which is strongest in the root. It was formerly employed in diarrhœa and other complaints requiring the use of astringents. *Sanguisorba officinalis*, a plant which grows in moist meadows on chalky and limestone soils, is called *Great Burnet*, or *Meadow Burnet*; but Dr. Lindley makes a great mistake when, in his "Vegetable Kingdom," he states that it is "a useful fodder." The plant which is so used is the *Common Burnet* (*Poterium sanguisorba*), found plentifully on the chalky downs of England, and used also as a garden salad plant. The French call it *Pimpinelle*, and use it extensively in their salads. It received its generic name, *poterium*, from being used in cool tankards. The root of *Sanguisorba canadensis* is said to be bitter and astringent, acrid, nauseous, and emetic, and the fruit stupefying. The fruit of *Margyricarpus setosus*, or *Pearl-fruit*, is gratefully acid, and an infusion of the plant is used in Brazil against hemorrhages. The leaves of *Acaena sanguisorba* are used in Van Dieman's Land as a substitute for tea; and the South American species are supposed to be diuretic.

ROSIDÆ.—The Rose is an extensive genus, comprising upwards of two hundred distinct species, which are distributed over a great portion of the globe. Several of them are natives of Britain, and may be found in woods and hedge-rows; but those which are cultivated in gardens are either species, or the varieties of species, indigenous to other countries. All the varieties of *Scotch Roses* have originated from *Rosa spinosissima*, which is plentiful in Britain. The *Damask Roses* are derived from the species *R. damascena*, a native of Syria. The *Hundred-leaved*, called also *Provins* and *Cabbage Roses*, are varieties of *R. centifolia*, a native of the Caucasus. From both of these the *Attar* or *Otto of Roses* is obtained. The otto of roses is the oil of the rose, which is procured by distillation, and varies in quality according to the quarter from whence it comes. It is made in India, Persia, and Turkey; that made in India is from *R. damascena*, and *R. Moschata* furnishes that which is obtained from Persia and Turkey. From

Dr. Jackson's paper in the "Journal of the Asiatic Society," we gather the following account of the manner in which otto of roses is obtained:—"Round the station of Ghazceppore there are about 150 acres of ground laid out, in small detached fields, as rose-gardens, most carefully protected on all sides by high mud walls and prickly-pear fences, to keep out the cattle. Every beegah, or half acre, contains 1,000 roses, and if the season is good, this beegah should yield one lac of roses. The roses come into flower at the beginning of March, and continue so through April. In the morning early the flowers are plucked by numbers of men, women, and children, and are conveyed in largo bags for distillation. The native apparatus for distilling is of the simplest description; it consists of a large copper or iron boiler well-tinned, capable of holding from eight to twelve gallons, having a large body with rather a narrow neck, and a mouth about eight inches in diameter; on the top of this is fixed the head of the still, which is nothing more than an old 'dekehee,' or cooking vessel, with a hole in the centre to receive the tube or worm. The tube is composed of two pieces of bamboo fastened at an acute angle, and it is covered the whole length with a strong binding of corded string, over which is a luting of earth, to prevent the vapour from escaping. The small end, about two feet long, is fixed into the hole in the centre of the head, where it is well luted with flour and water. The lower arm or end of the tube is carried down into a long-necked vessel or receiver, called a 'bhubka;' this is placed in a 'handee' of water, which as it gets hot is changed. The head of the still is luted on to the body, and the long arm of the tube in the 'bhubka' is also well-provided with a cushion of cloth, so as to keep in all vapour. The boiler is let into an earthen furnace, and the whole is ready for operation.

"To procure the otto, or attar, the roses are put into the still, and the water passes over gradually, as in the rose-water process. After the whole has come over, the rose-water is placed in a large metal basin, which is covered with wetted muslin tied over, to prevent insects or dust getting into it. This vessel is let about two feet into the ground, which has been previously wetted with water, and it is allowed to remain quiet during the whole night. The attar is always made at the beginning of the season, when the nights are cool. In the morning early, the little film of attar which is formed upon the surface of the rose-water during the night is removed by means of a feather, and it is then carefully placed in a small phial, and day after day, as the collection is made, it is placed for a short period in the sun, and after a sufficient quantity is procured, it is poured off clear, and of the colour of amber, into small phials. From one lac of roses, it is generally calculated that 180 grains, or one tolah, of attar can be procured. More than this can be obtained, if the roses are of full size and the nights cold to allow of the congelation." Attar of Roses is said to be obtained in Macedonia by crushing the petals in mills, expressing the fluid part, filtering it, and then exposing it to the sun in small glass vessels. The oil gradually collects on the surface of the liquid, and is removed. There is also a manufactory of the article at Florence, which is conducted by a convent of friars. *Rose Water* is obtained by distilling one gallon from two pounds of roses and two gallons of water. When properly prepared, it has the delightful perfume of the rose in great perfection; but it should never have alcohol added to it, as it is said to render it sour, by promoting the acetous fermentation.

The odour of *rose leaves* is said to be increased by iodine. They should be collected when the flower is fully expanded, but has not begun to fall; and they may be preserved fresh for a considerable time by compressing them with alternate layers of common salt in a well-closed vessel, or beating them with twice their weight of that substance.

Rosa gallica, the *French* or *Officinal Rose*, is a native of Europe and the East. It also supplies us with numerous varieties of garden roses. It is this species which is used medicinally, from the pleasant astringency of its petals, which have not the fragrance of those of *R. centifolia*. Their odour is, however, increased by drying, while that of the damask rose is almost destroyed. They are kept dried, and are employed in making gargles, and as a vehicle for tonic and astringent medicines. The *Eglantine*, or *Sweet Briar*, is *R. rubiginosa*, and is a native of Britain. *Rosa canina* is the common *Dog Rose* found in the hedges, woods, and thickets of this country. Its fruit is called "hips," or "heps," and has a peculiar and grateful flavour, particularly if made into a conserve with sugar. The pulp of the fruit, besides saccharine matter, contains citric acid, which gives it an acid taste. *China* or *Monthly Roses* are varieties of *R. indica*, as are also the *Noisette* and the *Tea-scented Roses*. *Fairy Roses* are *R. Laurenciana*, and *Ayrshire Roses* are *R. arvensis*.

Calycantheæ.—*Calycanthus floridus* is called *Carolina Allspice*. The flowers have a sweet, apple scent; the wood and roots smell strongly of camphor; the bark is aromatic, similar in fragrance and vigour to cinnamon, and is used in America as a stimulant tonic. *Chimonanthus fragrans* is a native of Japan, and has flowers of delightful fragrance, but its bark and leaves are inodorous, and have a biting, acrid taste.

Pomeæ.—In this sub-class we have the apples, pears, quince, medlars, sorbs, haws, and other apple-like fruits. The *Quince* is *Cydonia vulgaris*, a native of the south of Europe, but very generally cultivated in this country both as a fruit and an ornamental tree. Its fruit, of which there are several varieties, is seldom eaten raw, but is stewed, and introduced into pies and puddings, to which it makes a pleasant addition much esteemed. It makes an excellent marmalade, and a syrup prepared from it may be used as a grateful addition to drinks in sickness, especially in looseness of the bowels, which it is supposed to restrain by its astringency. The expressed juice, repeatedly taken in small quantities, is said to be cooling, astringent, and stomachic. A mucilage prepared from the seeds was formerly much in use, but is now supplanted by the simple gums.

The *Pear Tree* is *Pyrus communis*, a native of the woods of Europe, and plentiful in Britain. From the wild pear all our cultivated varieties have originated. As an eatable fruit, the pear is too well known to require description; and as it would be beyond the intention of this work to notice any of the varieties, we shall merely confine our remarks to the uses which the pear tree supplies. Besides being employed as a dessert fruit, there are varieties of the pear which are admirably adapted for baking, and for converting into compôtes and marmalades. They are also dried in ovens, and preserved during winter as an article of food, on the continent; and this use of them is as common in France as the making of apple pies in this country. From the expressed juice a fermented liquor, known by the name of *perry*, is made, some of which is not inferior to

many foreign wines, when particular attention has been given to the selection of the fruit and its manufacture. The fruits which are employed in the making of perry are austere, hard, and uncatable; yet those which are the least palatable always make the best liquour. The wood of the pear tree is heavy, fine-grained, strong, and compact, with a slight tinge of red in it. When green it weighs 79 lb. 5 oz. to the cubic foot, and when dry from 49 lb. to 53 lb. It is much used by turners and pattern-makers, and the blocks with which the patterns on floor-cloths are printed are all made of pear wood. It is readily dyed black, when it so closely resembles ebony as to be scarcely distinguishable from it, and is then used for various articles which are dyed black in imitation of ebony. It makes excellent fuel, burns with a bright flame, and yields an intense heat. The leaves dye yellow, and may be used to give green to blue cloths.

The most useful of all British Fruits is the *Apple* (*Pyrus malus*). It is a native of Britain, and may be found in woods and hedges in the form of the common *Wild Crab*, of which all our best apples are merely seminal varieties, produced by culture or particular circumstances. The apple, as is well known, forms a very important article of food, in the form of pies and puddings, and in some counties a necessary beverage is made from the fermented juice, and called *eider*. It also affords several delicacies, as sauces, marmalades, and jellies, and is highly esteemed as a dessert fruit. When baked in ovens, and flattened in the form of round cakes, they are called *Beefings*; and large quantities are annually dried in the sun, both in Normandy and America, and stored for use during winter, when they may be stewed or used in pies. Roasted apples are remarkably wholesome; they have a laxative effect on the bowels, and strengthen a weak stomach. Scopoli recovered from a weakness of the stomach and indigestion from using them; and they are equally efficacious in putrid and malignant fevers, with the juice of lemons and currants. There is an old English beverage, called *Lamb's Wool*, or, more properly, *Lamasool*, composed of ale and the pulp of roasted apples, with sugar and spice. It is so called from *La maes abhal*, which, in ancient British, signifies the day of apple fruit, from being drunk on the apple feast in autumn. In France, a sort of rob, called by the Parisians *raisinée*, is made by boiling any given quantity of new wine, skimming it as often as fresh scum rises, and when it is boiled to half its bulk, straining it. To this apples, pared and cut into quarters, are added; the whole is allowed to simmer gently, stirring it all the time with a long wooden spoon, till the apples are thoroughly mixed with the liquour, and the whole forms a species of marmalade, which is extremely agreeable to the taste, being sweet, with a slight flavour of acidity, like lemon mixed with honey. In this country, where new wine, in sufficient quantity and at a reasonable price, cannot be obtained, *eider* may be substituted. From the juice of the wild crab *verjuice* is obtained, which, applied externally, is good against strains, spasms, and cramps. *Pomatum* receives its name from being originally made of the pulp of apples mixed with lard. The wood of the apple tree is very fine-grained, hard, and compact, and, when green, weighs from 48 lb. to 56 lb. per cubic foot; when dried it loses about a tenth. It is used for turning, and various purposes where hardness, compactness, and variegation of colour are objects. The small *Cherry Apple*, or *Scarlet Siberian Crab*, as it is some-

times called, is *Pyrus baccata*, a native of Siberia, where it is used for making *quasar punch*. It is a highly ornamental tree in this country, and its fruit makes an excellent preserve.

The *White Beam-tree* is a native of Britain, on chalky or limestone soils, in mountainous places. It is called *Pyrus aria*. Its fruit is acid and astringent, but is not disagreeable to eat when in a state of incipient decay, like the medlar. When dried and reduced to powder, it has been converted into a sort of bread, during times of scarcity, both in France and Sweden; and, when fermented, it forms a beer, or, by distillation, a powerful spirit. It is greedily eaten by birds, for which reason the trees are ordered to be preserved in French forests, that the number of birds may be increased, in order to keep down the insects. The fruit also furnishes food to squirrels, and when it drops, deer and the hedgehog eat it with avidity. The wood is very hard, of a fine close grain, yellowish white, and susceptible of a high polish. It may be stained of any colour, and is much used in making handles to knives and forks, wooden spoons, and for musical instruments, and various articles of turnery-ware. The fruit of *P. torminalis*, or *Wild Service*, is not much larger than that of the hawthorn, and becomes agreeably acid and wholesome after it has been subjected to the influence of frost, so much so that Ray preferred it to the flavour of the true Service. It is sometimes met with in the markets, both of this country and France, and if kept until it begins to "blet," it is not unlike the fruit of the medlar. *P. rivularis* is a native of the north-west coast of America. Its wood is employed for making wedges, and is so hard as to be susceptible of a high polish. The fruit is used as an article of food, and is called by the Cherook Indians *Pow-itch*.

The *Mountain Ash* (*Pyrus aucuparia*) is one of the most ornamental trees we have, either in woods or shrubberies, both from the gracefulness of its foliage, and the beauty of its berries. The tree is a native of Britain, and may be found plentifully in mountainous parts. The fruit is too well known to require description, and is eaten in some districts of Scotland and Wales. In some parts of the north of Europe, the berries are dried and ground into flour, and used as a substitute for the flour of wheat in times of scarcity. In Livonia, Sweden, and Kamschatka, they serve as an article of food. When fermented they afford an agreeable fermented liqueur, and, by distillation, a strong spirit. In Russia, a tincture is formed of the fruit, which is highly esteemed as a stomachic, and is made by filling a small cask two-thirds full of the ripe berries, which have been picked and cleaned. It is then filled up with any strong spirits, as gin, brandy, or rum, and allowed to stand in a cold cellar for twelve months, when it is run off from the fruit, completely impregnated with its colour and flavour. A glass of this liquor is taken each forenoon during the winter months, and causes a glow over the whole body. An excellent jelly is made with the fruit, which, after being picked clean, are put into a large jar, and placed either in an oven or a saucepan of boiling water, until they part with their juice. They are then strained through a sieve, but not pressed, and the juice, after being weighed, is boiled with an equal weight of loaf-sugar till it is of the proper consistence. This is admirably adapted for eating with venison, game, or mutton, instead of red current jelly, and has a peculiar astringent flavour, which is very agreeable. The wood is

hard and fine-grained, capable of being stained any colour, and susceptible of a high polish. In the days of superstition, the mountain ash was held in great veneration; and, even to this day, the country people in the Highlands of Scotland and in Wales regard it with some degree of reverence or dread, as a spell against the power of fairies, witches, and evil spirits. In Scotland it is called *rowan-tree* or *roddon-tree*, and branches of it are hung over door-ways, and in stables and cow-houses; some carry a piece about their person as a charm against the effect of witchcraft or enchantment. The dairymaid will drive the cows to pasture with a rod of the rowan-tree; and, in Strathspey, on the first of May, all the sheep and lambs are caused to pass through a hoop made of the wood, both morning and evening. In Wales they are frequently planted in churchyards, and on a certain day in the year, the people wear a cross made of the wood, as a preservative against fascination and evil spirits. It would appear to have been regarded in a religious light by the Druids, as some old stumps may still be found growing about druidical circles.

The fruit of the true *Service Tree* (*Pyrus domestica*) is extremely austere, but when subjected to the influence of frost, and has begun to decay, it resembles a medlar, and is much relished by some. It is common in Italy, and ripens at Genoa in September, where it is esteemed good in dysentery and fluxes. The wood is the hardest and heaviest of all the indigenous woods of Europe, and weighs 72 lbs. 2 oz. to the cubic foot. It has a compact, fine grain, a reddish tinge, and takes a high polish. It is much used in France, by millwrights, for making cogs to wheels, rollers, cylinders, blocks and pulleys, spindles and axles, and for all those parts of machinery which are subject to much friction, and require great strength and durability. It is also preferred to all other kinds of wood for making screws to wine-presses; and in this country, for mathematical rulers and excisemen's gauging-sticks. The fruit of the *Medlar* (*Mespilus germanica*) is much relished by some after they have undergone incipient decay, or become what is termed "bletted." The berries of *Amelanchier ovalis*, a native of North America, are about the size of a pea, and are used by the Cree Indians both in a fresh and dried state; they make excellent puddings, little inferior to plum pudding. The wood is prized by these same Indians for making arrows and pipe-stems. The *Loquat*, or *Japan Medlar* (*Eriobotrya Japonica*), produces a yellow, downy fruit, about the size of a large gooseberry, which has a taste approaching that of the apple. Sir Joseph Banks considered it equally good with the mango, but any that we have ever tasted must either have been very inferior in flavour, or we were unable to appreciate their good qualities. The *Common Hawthorn*, or *May*, is *Crategus oxyacantha*, with the coral *haws* of which there are few who were not acquainted in their early youth, when they hung tempting in the hedgerows. The wood is very hard and difficult to work, and is employed for the handles of hammers, the teeth of mill-wheels, for flails and mallets, and, when heated at the fire, for canes and walking-sticks. The pretty evergreen shrub which is seen against the fronts of houses, and in winter covered with its clusters of red berries, is the *Pyracantha*, or *C. pyracantha*. The wood of *C. punctata* is so hard, that the Indians of the west coast of America make wedges of it for splitting trees. The fruit of the *Azarole* (*C. azarolus*), is esteemed in Italy, where it is served in the dessert.

ORDER LXXII.—LYTHRACEÆ—LOOSESTRIFES.

HERBS, shrubs, or trees. *Leaves* opposite or in whorls, simple, feather-



Fig. 97. *Cuphea verticillata*.

nerved, sometimes with glandular dots, and always without leaflets at their base. *Flowers* hermaphrodite, regular, but sometimes irregular, as in *Cuphea*. *Calyx* permanent, free, tubular or bell-shaped, divided into a variable number of lobes disposed in two series.

Corolla with petals equal or less in number than the inner lobes of the calyx, and inserted in the summit of the tube. *Stamens* equal in number to the petals, and inserted lower down in the tube of the calyx; and sometimes they are twice, thrice, or even four times as numerous, but they are seldom fewer.

Ovary free. *Style* simple. *Stigma* capitate. *Fruit* a capsule enclosed in the tube of the calyx; membranaceous, with one, two, or more, many-seeded cells, bursting irregularly at maturity. *Seed* without albumen, either wingless or with a marginal membrane expanding into a wing. *Embryo* straight, with a radicle turned toward the hilum, and the seed-lobes flat and foliaceous.

TRIBE 1. LYTHREÆ—Seeds wingless.

GENERA AND SYNONYMES.

<i>Cryptotheca</i> , Bl.	<i>Ptilina</i> , Nutt.	<i>Chabræa</i> , Ad.	,, <i>Diplostemon</i> , [W & A.
<i>Suffrenia</i> , Bellard.	<i>Didiplis</i> , Raf.	<i>Glaux</i> , Vaill.	
<i>Rotala</i> , L.	<i>Peplis</i> , L.	<i>Ameletia</i> , DC.	<i>Cornelia</i> , Ard.
<i>Eutelie</i> , R. Br.	<i>Portula</i> , Dill.	<i>Ammannia</i> , Hout.	<i>Haplocarpæa</i> , [W & A.
<i>Hypobrichia</i> , Curt.	<i>Glaucoides</i> , Mich.	<i>Tritheca</i> , W & A.	

<i>Dithaea</i> , <i>W & A.</i>	<i>Lythrum</i> , <i>L.</i>	<i>Parsonia</i> , <i>P. Br.</i>	<i>Genoria</i> , <i>Pers.</i>
<i>Maclellandia</i> , <i>W & A</i>	<i>Salicaria</i> , <i>T.</i>	<i>Balsamona</i> , <i>Vand</i>	<i>Grislea</i> , <i>Löffl.</i>
<i>Nesaea</i> , <i>Comm.</i>	<i>Pythagorea</i> , <i>Raf.</i>	<i>Melvilla</i> , <i>Ander.</i>	<i>Woodfordia</i> , <i>Sal.</i>
<i>Tolypeuma</i> , <i>E.M.</i>	<i>Mozula</i> , <i>Raf.</i>	<i>Duvernaya</i> , <i>Desp</i>	<i>Adenaria</i> , <i>Kunth.</i>
<i>Chrysoliga</i> , <i>Hoffm</i>	<i>Pentaglossum</i> , <i>Forsk</i>	<i>Banksia</i> , <i>Domb.</i>	<i>Antherylium</i> , <i>Rohr.</i>
<i>Ginoria</i> , <i>M & S.</i>	<i>Anisotes</i> , <i>Lindl.</i>	<i>Acisanthera</i> , <i>P.Br.</i>	<i>Lawsonia</i> , <i>L.</i>
<i>Trotula</i> , <i>Comm.</i>	<i>Pleurophora</i> , <i>Don.</i>	<i>Crenea</i> , <i>Aubl.</i>	<i>Alcanna</i> , <i>Gært.</i>
<i>Heimia</i> , <i>L & O.</i>	<i>Cuphea</i> , <i>Jacq.</i>	<i>Dodecas</i> , <i>L.</i>	<i>Abatia</i> , <i>R & P.</i>
<i>Pemphis</i> , <i>Forst.</i>	<i>Melanium</i> , <i>P.Br.</i>	<i>Ginoria</i> , <i>Jacq.</i>	

TRIBE 2. Lagerströmæ.—Seeds winged.

GENERA AND SYNONYMS.

<i>Diplusodon</i> , <i>Pohl.</i>	<i>Dubyæa</i> , <i>DC.</i>	<i>Physocalymnia</i> ,	<i>Münchausia</i> , <i>L.</i>
<i>Diplodon</i> , <i>Sp.</i>	<i>Lafoensia</i> , <i>Vand.</i>	[<i>Pohl.</i>	<i>Adambea</i> , <i>Lam.</i>
<i>Friedlandia</i> , <i>C & S</i>	<i>Calypsectus</i> , <i>R & P</i>	<i>Lagerströmia</i> , <i>L.</i>	<i>Duabanga</i> , <i>Ham.</i>
	<i>Ptychodon</i> , <i>Klot.</i>	<i>Banava</i> , <i>Cam.</i>	<i>Fatioa</i> , <i>DC.</i>

DOUBTFUL GENERA.

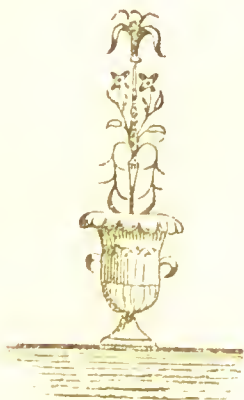
Symmetria, *Bl.* | *Physopodium*, *Desv.* | *Psyloxylon*, *Ner.*

GEOGRAPHICAL DISTRIBUTION.—The *Loosestrifes* are found in the temperate regions of both hemispheres, and between the tropics. They are frequent in North America.

PROPERTIES AND USES.—Some of the species are astringent, while others yield resinous substances, and many are emetic, purgative, diuretic, and acrid.

The leaves of *Ammannia vesicatoria*, a native of the East Indies, have a strong smell of muriatic acid, are extremely acrid, and are used by the natives as blisters in rheumatism. Dr. Ainslie states that the fresh bruised leaves applied to the part intended to be blistered, perform their office in half an hour most effectually; but Dr. O'Shaughnessy says that, in his experience, blisters were not produced in less than twelve hours, and the pain occasioned, until the blister rose, was most agonizing, although the leaves were removed after being applied for half an hour. They cause more pain than cantharides, and are far inferior to *Plumbago rosca* in celerity and certainty of action. *Nesaea verticillata*, which grows in marshy places in North America, causes cows which eat it to cast their young prematurely. The expressed juice of *Heimia syphilitica* is considered, by the inhabitants of Mexico, a powerful antisiphilitic. Taken in doses of four ounces, it excites violent perspiration and secretion of urine, and is said to cure venereal diseases in an incredible short space of time. *Pemphis acidula* is common on the shores of tropical Asia, where it is used as a potherb. *Lythrum salicaria* or *Common Loosestrife*, a plant common in Britain, is excellent in cases of inveterate diarrhoea. The whole plant is dried for use, and its decoction, which renders water mucilaginous, is blacked by sulphate of iron. It is demulcent and astringent, and is given in doses of a drachm of the powdered herb two or three times a day; and a decoction of the root, made by boiling an ounce in a pint of water, may be given in the dose of two fluid ounces. *L. hyssopifolium* possess vulnerary, aperient, and anti-scorbutic virtues, as does also *L. alatum*. The flowers

of *Grislea tomentosa* are used for dyeing yellow in India, under the name of *Dhaee*. The *henné* of the Egyptians is *Lawsonia alba*, with the powdered leaves of which the Egyptian women make a paste to dye their nails and fingers yellow, which they regard as ornamental. The flowers are white, very fragrant, and are much prized by the women, who constantly carry them about with them. "The women," says Sonnini, "attach to the possession of this flower, which the mildness of the climate and the facility of culture seldom deny them, so high a value that they would reserve it to themselves exclusively; and they cannot, with any degree of patience, bear that it should be worn by the Jewish and Christian women." The colour which the plant furnishes is adherent and durable, and may be varied from yellow to the brightest red. In Egypt it formed a considerable article of trade, fourteen or fifteen ships being annually laden at Alexandria with these leaves, reduced to powder, and despatched to Smyrna, Constantinople, and Salonicia, from whence their cargoes passed into several countries of the north, and even to Germany, where the powder is used in dyeing furs, and in the preparation of leather. The root of *Lagerströmia reginæ* is astringent, and good against aphthous ulcerations of the mouth; and a decoction of the bark, leaves, and flowers, is purging and hydragogue; the seeds are narcotic. The wood of *Physocalymma floribunda* is beautifully rose-coloured, and is much esteemed by cabinet-makers. It is the celebrated Rose-wood of commerce. The tree is found in the province of Goyaz, in Brazil, and grows to the height of thirty feet.



ORDER LXXIII.—VOCHYSIACEÆ—THE VOCHYSIA FAMILY.

TREES, rarely shrubs or under shrubs. *Leaves* opposite or in whorls, but sometimes alternate at the tops of the branches, quite entire, feather-nerved, and with two leaflets at the base. *Flowers* hermaphrodite, irregular, Fig. A. *Calyx* free, or rarely adherent to the ovary, with four or five unequal lobes, imbricate in æstivation, the upper one drawn out into a spur. *Corolla* with from one to five petals alternating with the lobes of the calyx, and inserted at their base. *Stamens* usually opposite the petals, rarely alternate with them, and inserted at the bottom of the calyx; the most of them generally sterile and small, only one fertile, and bearing an ovate anther. *Ovary* free, or adhering to the calyx, three-celled, with one, two, or few ovules in each, cell attached to the base of the axis. *Style* one. *Stigma* one. *Fruit* a three-seeded capsule, with three cells, and three-valved; valves opening along their middle, Fig. B. *Seeds* without albumen. *Embryo* straight, inverted, with large, leafy, plaited seed-lobes.



Fig. 98. *Vochysia rotundifolia*.

GENERA AND SYNONYMES.

Callisthene, <i>M. & Z.</i>	Schüchhia, <i>Endl.</i>	Salmonia, <i>Neck.</i>	Erismia, <i>Rudg.</i>
Callisthemia, <i>Sp.</i>	Vochysia, <i>Juss.</i>	Cucullaria <i>Schreb</i>	Debræa, <i>H. & S.</i>
Amphilochia, <i>Mart.</i>	Vochy, <i>Aubl.</i>	Struckeria, <i>Fl. Fl.</i>	Dittmaria, <i>Sp.</i>
Agardhia, <i>Sp.</i>	Vochya, <i>Vandell.</i>	Salvertia, <i>St. Hil.</i>	? Lozania, <i>Seb. Mut</i>
Qualca, <i>Aubl.</i>			

GEOGRAPHICAL DISTRIBUTION.—This family is found on plains, and the banks of rivers, in the primeval forests of Guiana and Brazil.

They are not known to possess any properties, or to yield any products.



ORDER LXXIV.—SAXIFRAGACEÆ—SAXIFRAGES.

HERBS, shrubs, and sometimes trees. *Leaves* alternate or opposite, sometimes in whorls, simple or compound, and with or without leaflets at their base. *Flowers* hermaphrodite, regular. *Calyx* with five lobes, rarely three to ten, either distinct or more or less united to each other and adherent to the ovary. *Corolla* with five petals, rarely less. *Stamens*, Fig. A, equal in number to that of the petals, or double their number, very rarely indefinite, inserted with the petals on the tube of the calyx. *Ovary* free, or more or less adherent to the calyx, generally composed of two carpels more or less united together. *Styles*, Fig. B, equal in number to the carpels, distinct. *Stigma* simple. *Fruit*, Fig. C, a capsule, one or two-celled, Fig. D, many-seeded, often terminated with two small horns. *Seeds* with a thick, fleshy albumen. *Embryo* with short, semi-cylindrical or ovate seed-lobes, with the radicle next the hilum.

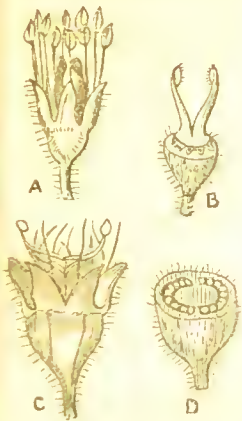


Fig. 99. *Saxifraga granulata*.

SUB-ORDER I.—SAXIFRAGACEÆ.

Herbs with alternate or opposite leaves, either without leaflets at the base, or with the footstalk indented at the base in the form of a leaflet.

GENERA AND SYNONYMES.

<i>Eremosyne</i> , Endl.	„ <i>Cotyledon</i> , Gaud.	<i>Diptera</i> , Borkh.	<i>Heuchera</i> , L.
<i>Donatia</i> , Forst.	<i>Trigonophyllum</i> , [Gaud.]	<i>Ligularia</i> , Duval	<i>Tolmiea</i> , T. & G.
<i>Vahlia</i> , Th.	<i>Porophyllum</i> , [Gaud.]	<i>Cotylia</i> , Haw.	<i>Mitellopsis</i> , Meisn.
<i>Russelia</i> , L. f.	<i>Muscaria</i> , Haw.	<i>Lobaria</i> , Haw.	<i>Drummondia</i> , DC
<i>Bistella</i> , Del.	<i>Triplinervium</i> , [Gaud.]	<i>Kingstonia</i> , Gray	<i>Mitella</i> , T.
<i>Nimmoia</i> , Wight.	<i>Eropheron</i> , [Gaud.]	<i>Ciliaria</i> , Haw.	<i>Tellima</i> , R. Br.
<i>Boykinia</i> , Nutt.	<i>Megasea</i> , Haw.	<i>Leptasea</i> , Haw.	<i>Lithophragma</i> , [Nutt.]
<i>Zahlbruckneria</i> , [Reichb.]	<i>Geryonia</i> , Schrk.	<i>Leptarrhena</i> , R. Br.	<i>Sullivantia</i> , Torr.
<i>Oreosplenium</i> , [Zahlb.]	<i>Eriogynia</i> , Hook.	<i>Lütkea</i> , Bong.	<i>Tiarella</i> , L.
<i>Saxifraga</i> , L.	<i>Lepuropetalum</i> , Lll	<i>Cryptopetalum</i> , [Hook.]	<i>Blondia</i> , Neck.
<i>Antiphylla</i> , Haw.	<i>Pyxidanthera</i> , [Mülenb.]	<i>Chrysosplenium</i> , T.	<i>Anthonema</i> , Nutt
<i>Calliphyllum</i> , [Gaud.]			<i>Hoteia</i> , M. & D.
<i>Chondrosea</i> , Haw.			<i>Astilbe</i> , Hamilt.
			<i>Oresitrophe</i> , Bung.

SUB-ORDER II.—CUNONIEÆ.

Shrubs or trees with opposite, simple, or compound leaves, with leaflets between the footstalks. *Calyx* free, or more or less adherent. *Corolla* with four or five petals, sometimes wanting. *Ovary* two to four-celled.

GENERA AND SYNONYMES.

Codia, <i>Forst.</i>	Anodopetalum,	Arnoldia, <i>Bl.</i>	Belangera, <i>Camb.</i>
Callicoma, <i>Andr.</i>	[<i>Cunn.</i>	Gumillea, <i>R. & P.</i>	Polystemon, <i>Don</i>
Calycomis, <i>R. Br.</i>	Weinmannia, <i>L.</i>	Caldclavia, <i>Don.</i>	Lamanonia, <i>Fl. Fl.</i>
Aphanopetalum,	Windmannia, <i>P.</i>	Dieterica, <i>Ser</i>	Bauera, <i>Kenned.</i>
[<i>Endl.</i>	[<i>Br.</i>	Cunonia, <i>L.</i>	Adenilema, <i>Bl.</i>
Ceratopetalum, <i>Sm.</i>	Leiospermum, <i>Don.</i>	Osterdyckia	Pellacalyx, <i>Korth.</i>
Schizomeria, <i>Don.</i>	Ackama, <i>A. Cunn.</i>	[<i>Burm.</i>	Ochranthe, <i>Lindl.</i>
Platylophus, <i>Don.</i>	Pterophylla, <i>Don.</i>	Geissois, <i>Labill.</i>	Raleighia, <i>Gardn.</i>

SUB-ORDER III.—HYDRANGEÆ.

Shrubs. Leaves opposite, simple, without leaflets at their base. Ovary inferior, or rarely free. Fruit a capsule, or rarely a berry.

GENERA AND SYNONYMES.

Hydrangea, <i>L.</i>	Cardiandra, <i>S. & Z.</i>	Jamesia, <i>T & G.</i>	Adamia, <i>Wall.</i>
Hortensia, <i>Juss.</i>	Platycrater, <i>S. & Z.</i>	Cornidia, <i>R & P.</i>	Cyanites, <i>Reinw.</i>
Peautia, <i>Comm.</i>	Schizophragma, <i>S & Z</i>	Sarcostyles, <i>Prest</i>	Broussaisia, <i>Gaud.</i>
Primula, <i>Lour.</i>			

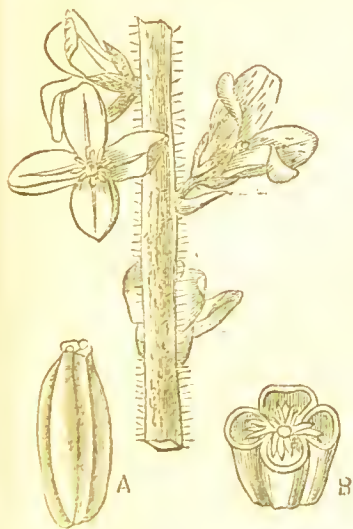
GEOGRAPHICAL DISTRIBUTION.—The *Saxifragæ* are found most numerous in the mountainous regions of the northern hemisphere; they are abundant in North America, and on the mountains of America between the tropics; but towards the south pole, they become rare. The *Cunoniæ* are frequent in the southern hemisphere beyond the tropics, particularly in Australia; rare in tropical America. The *Hydrangeæ* are met with in northern India, Japan, and North America, but are rare in Peru and Java.

PROPERTIES AND USES.—Astringency is the prevailing quality in the Saxifrages. The small granulated roots of *Saxifraga granulata* were formerly reputed as beneficial in calculous diseases. *S. crassifolia*, a native of Siberia, is said to be used by some as a substitute for tea. *S. tridactylites* has been recommended in diseases of the liver; and *Chrysosplenium alternifolium* had some reputation in former times as a tonic. The only plant of this sub-class which has any pretension to be considered officinal is *Heucheria americana*, or *Alum-root*, a plant growing abundantly in rocky, shady situations all throughout the United States. The root is powerfully astringent, and is applied by the Indians to wounds and obstinate ulcers. Dr. Barton states that it forms the basis of a powder which enjoys some reputation as a cure for cancer.

Canoniæ.—At the Cape of Good Hope *Cunonia capensis* is called *Red Alder*, or *Rood Els*. The wood is tough, close, somewhat like the lime tree, and much in request. It is handsome when polished, and the planks are sought after both by cabinet-makers and wheelwrights. It is also useful to turners, and well adapted for screws. *Platylophus trifolius* is called *White Alder* or *Wit Els*. It is a larger tree than the preceding, with a diameter of from three to four feet in the trunk. The wood is white, much lighter, and furnishes material for common furniture, drawers, boxes, and picture-frames, and looks well when polished. The bark of some of the American *Weinmannias* is used for tanning leather in Peru, and also for adulterating Peruvian bark. Many of the Australian species yield gum. None of the *Hydrangeas* are known to possess any properties, which is compensated for by the great beauty and splendour of their flowers.

ORDER LXXV.—FRANCOACEÆ—FRANCOA FAMILY.

HERBACEOUS plants. *Leaves* all proceeding from the root, alternate, lyre-shaped, or pinnatifid. *Flowers* hermaphrodite, regular, or somewhat irregular. *Calyx* four-lobed, permanent. *Corolla* with four petals inserted in the base of the calyx, and alternating with its lobes. *Stamens* eight, inserted with the petals, each alternate one sterile. *Ovary*, Fig. A, free, with four lobes corresponding to as many cells; *ovules* indefinite; *stigma*, sessile, with four obtuse lobes. *Fruit*, Fig. B, a capsule with four many-seeded cells, opening in four valves by their edges. *Seeds* numerous, small, inserted in the inner angle of the cells, containing an embryo, placed in the base of a fleshy albumen.

Fig. 100. *Francoa appendiculata*.

GENERA AND SYNONYMES.

Francoa, Cav.

Llaupanke, Feuill.

Tetilla, DC.

Demorphopetalum, Bert.

Anarmosa, Miers.

Tetraplasium, Kunze.

These are all natives of Chili. The roots of *Francoa* furnish a black dye, and their juice is considered cooling and sedative. *Tetilla hydrocotylefolia* is called by the Chilians *Tetu de capra*, and the stalks of the leaves are eaten as a cure for dysentery, and for their acid flavour; they are also eminently astringent.



ORDER LXXVI.—CRASSULACEÆ—STONECROPS.

HERBACEOUS, woody, and fleshy plants. *Leaves* alternate, sometimes opposite, rarely ternate, or unequally pinnate, without leaflets at their base. *Flowers* generally hermaphrodite, regular, Fig. A. *Calyx*, Fig. c, with generally five lobes, rarely from three to twenty. *Corolla* with *Petals* equal in number with the lobes of the calyx, sometimes united together at the base, Fig. B. *Stamens* from five to ten, rarely three to seven or more, inserted on the calyx or united to the corolla, when it is monopetalous, as in *Echeveria*. *Ovaries* free, equal in number to that of the petals, one-celled, distinct, or united at their base, where they are accompanied with small, flat, hypogynous scales. *Style* simple, terminating each ovary. *Fruit*, Fig. D, composed of several many-sided carpels, opening by the inner suture, and cohering more or less by their base, rarely united into a many-celled capsule. *Seeds* attached to the margins of the sutures, Fig. E, in two rows, variable in number. *Embryo* straight in the axis, of very thin fleshy albumen, having the radicle directed to the hilum.

Fig. 101. *Cotyledon cymosa*.

TRIBE 1. *Crassulææ*.—Carpels free, opening by their inner suture.

GENERA AND SYNONYMS.

<i>Tillæa</i> , Mich.	<i>Grammanthes</i> , DC.	<i>Crassouvia</i> , Com.	<i>Sedum</i> , L.
<i>Buliarda</i> , DC.	<i>Vananthes</i> , Haw.	<i>Physocalycium</i> ,	<i>Rhodiola</i> , L.
<i>Helophytum</i> Ed & Z	<i>Cyrtogynce</i> , Haw	[Vest.]	<i>Anacampseros</i> , T.
<i>Cambesia</i> , Rich.	<i>Rochea</i> , DC.	<i>Cotyledon</i> , DC.	<i>Procrassula</i> , Gris.
<i>Disporocarpa</i> ,	<i>Larochea</i> , Pers.	<i>Pistorinia</i> , DC.	<i>Aithales</i> , W. & B.
[Mey.]	<i>Crassula</i> , Ad.	<i>Umbilicus</i> , DC.	<i>Sempervivum</i> , L.
<i>Dasystemon</i> , DC.	<i>Danielia</i> , DC.	<i>Orostachys</i> , Fsch.	<i>Jovibarba</i> , DC.
<i>Septas</i> , L.	<i>Franciscæa</i> , DC.	<i>Cotyle</i> , DC.	<i>Monanthès</i> , DC.
<i>Telmisssa</i> , Fenzl.	<i>Kalosanthès</i> Haw	<i>Cotylephyllum</i> ,	<i>Chronobium</i> , DC.
<i>Crassula</i> , Haw.	<i>Dietrichia</i> , Trall.	[Lk.]	<i>Aichryson</i> , W. & B
<i>Gomara</i> , Ad.	<i>Kalanchoë</i> , Ad.	<i>Mucizonia</i> , DC.	<i>Aconium</i> , W. & B.
<i>Turgosea</i> , Haw.	<i>Vercia</i> , Ad.	<i>Rosularia</i> , DC.	<i>Greenovia</i> , W. & B
<i>Globulea</i> , Haw.	<i>Vercia</i> , Ad.	<i>Echeveria</i> , DC.	<i>Petrophyc</i> , W. & B
<i>Thisantha</i> , E. & Z.	<i>Bryophyllum</i> , Sal.	<i>Pachyphytum</i> , Kl	

TRIBE 2. *Diamorphææ*.—Carpels united at the base, or throughout the whole of their length, into a many-celled capsule.

GENERA.

Diamorpha, Nutt.
Penthorum, L.

GEOGRAPHICAL DISTRIBUTION.—They are found in the warmer parts of the temperate regions of the Old World. One half of the known species

grow at the Cape of Good Hope; a sixth part is met with in Europe and the shores of the Mediterranean; another part in Central Asia and the Canary Isles, while a third part is dispersed over America, the warmer parts of Asia, and Australia.

PROPERTIES AND USES.—The succulent plants of this family abound in a somewhat salt and aqueous juice, somewhat acrid, and charged with malic acid. Some are refrigerant, antiscorbutic, and diuretic, and some are even used as food.

Crassula tetragona is boiled with milk at the Cape of Good Hope, and used as a cure for dysentery. *Kalanchoë brasiliensis* is used by the Brazilians as a refrigerant. *K. laciniata*, and *Bryophyllum calycinum* are commended in Asia as possessing refrigerent and vulnerary properties. *Sedum rhodiola*, or *Common Rose-root*, is a native of Britain. The root is sweetish when dried, and in this state a fragrant water may be distilled from it. The inhabitants of Faro Island use it as a remedy for scurvy, and in Greenland it is eaten as a garden vegetable. A cataplasm of fresh roots, applied to the forehead, is said to relieve headache, and to heal malignant ulcers. A decoction of the leaves of *S. telephium*, in milk, is a powerful diuretic, and has been given with success in the cure of hemorrhoids. It has been regarded as vulnerary, and, when taken internally, as astringent, and beneficial in dysentery. *S. acre*, the *Common Stonecrop*, so plentiful on the tops of walls, is acrid, and, when chewed, has a hot, biting taste, and hence it has been called *Wall-pepper*. When taken internally, it causes vomiting and purging, and, applied to the skin, it produces inflammation and blisters. The fresh herb and the expressed juice have been used as an antiscorbutic, emetic, cathartic, and diuretic, and have been applied locally to old ulcers and warts; and even scrofulous and cancerous ulcers have been cured by their use. *Sempervivum tectorum*, the *Common Houseleek*, which may often be seen growing in large patches on the roofs of houses, gives immediate relief when applied to burns, stings of bees or hornets, ulcers, and other external affections attended with inflammation. The fishermen of Madeira rub their nets with the fresh leaves of *S. glutinosum*, by which they are rendered as durable as if tanned, provided they are steeped in some alkaline liquor.



ORDER LXXVII.—ILLECEBRACEÆ—KNOTWORTS.

HERBACEOUS or half shrubby, branching plants. *Leaves* generally opposite, rarely alternate, often in bundles, sessile, and with scarious leaflets at their base. *Flowers* hermaphrodite, regular, sometimes set in the axils of the leaves, and sometimes formed into a terminal cyme. *Calyx* with five, seldom three or four, lobes, sometimes joined to the middle, and sometimes nearly to the apex. *Corolla*, Fig. A, with small, scale-formed petals, inserted on the calyx, between the lobes, occasionally wanting, or converted into stamens. *Stamens* inserted in the tube of the calyx, exactly opposite the lobes, if equal to them in number, but sometimes fewer by abortion. *Ovary* free, often one-ovuled. *Styles* two to three, either distinct or partially combined. *Fruit*, Fig. B, small, dry, one-celled, usually membranous, either one-seeded, valveless and imopening, or opening with three valves. *Seeds* either numerous, fixed to a free central placenta, or solitary and pendulous upon a funicle arising from the base of the cavity of the fruit. *Embryo*, Fig. C, cylindrical, lying on one side of the albumen, with the radicle always pointing towards the hilum, and with small seed-lobes.

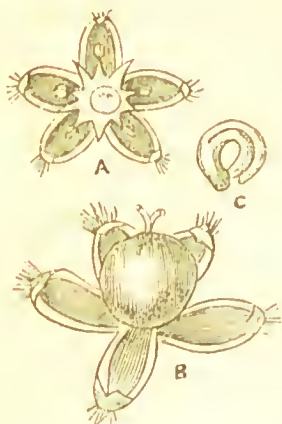


Fig. 102. *Paronychia argentea*.

GENERA AND SYNONYMES.

<i>Corrigiola</i> , L.	<i>Pteranthus</i> , Forsk.	<i>Hagea</i> , Bivon.	<i>Aylmeria</i> , Mart.
<i>Hernaria</i> , T.	<i>Louichea</i> , Herit.	<i>Arversia</i> , Camb.	<i>Spergularia</i> , Pers.
<i>Illecebrum</i> , Gært. f.	<i>Cometes</i> , Burm.	<i>Ilapalasia</i> , W. & A.	<i>Lepigonum</i> , Fries.
<i>Cardionema</i> , DC.	<i>Saltia</i> , R. Br.	<i>Ortega</i> , Lœffl.	<i>Stipularia</i> , Haw.
<i>Bivonæa</i> , M. & S.	<i>Pollichia</i> , Sol.	<i>Ortega</i> , DC.	<i>Delila</i> , Dumort.
<i>Pentacæna</i> , Bart.	<i>Neckeria</i> , Gmel.	<i>Junearia</i> , Chuss.	<i>Balardia</i> , Camb.
<i>Acanthonychia</i> , [DC]	<i>Meerburgia</i> , Men.	<i>Stipulicida</i> , Rich.	<i>Buda</i> , Ad.
<i>Paronychia</i> , Juss.	<i>Telephium</i> , T.	<i>Polycarpæa</i> , Lam.	<i>Tissa</i> , Ad.
<i>Gymnocarpus</i> , Forsk.	<i>Lœflingia</i> , L.	<i>Hagea</i> , Vent.	<i>Spergula</i> , L.
? <i>Winterlia</i> , Sp.	<i>Cerdia</i> , M. & S.	<i>Mollia</i> , W.	<i>Drymaria</i> , W.
<i>Sellowia</i> , Roth.	<i>Polycarpon</i> , Lœffl.	<i>Lahaya</i> , R. & S.	<i>Sclerocephalus</i> , [Boiss.]
? <i>Lithophila</i> , Sw.	<i>Trichlis</i> , Hall.	<i>Ilyala</i> , Herit.	<i>Dicheranthus</i> , Webb
	<i>Anthyllis</i> , Ad. p.	<i>Anthyllis</i> , Ad. p.	

GEOGRAPHICAL DISTRIBUTION.—They are generally found in the South of Europe, and the North of Africa. Some are found in North America and Mexico.

We are not aware that any of the species have been put to any use.

ORDER LXXVIII.—PORTULACACEÆ—PURSLANES.

FLESHY shrubs or herbs. *Leaves* alternate, rarely opposite; very thick and succulent, flat or cylindrical, and without leaflets at their base. *Flowers* hermaphrodite, regular, Fig. A. *Calyx* free or adherent to the ovary, with two lobes, seldom three; and sometimes furnished with small bracts at the base. *Corolla* with four or six petals, either distinct or more or less united at the base. *Stamens* equal in number to that of the divisions of the calyx, or double or triple that number, sometimes indefinite, inserted either on the receptacle or in the base of the calyx, and distinct, or united at the base by their filaments. *Ovary* free or rarely united with the calyx, simple one-celled, sometimes encircled with a disk at the base. *Style* terminal, with as many divisions as there are cells to the ovary, each surmounted by a capitate stigma. *Fruit* a one-celled capsule, Fig. B, opening either transversely, as in *Portulaca*, or in three longitudinal valves, Fig. C, or entirely indehiscent as in *Portulacaria*. *Seed*, Fig. D, attached to a central placenta furnished with farinaceous albumen. *Embryo*, Fig. E, curved round the circumference of the albumen, with a long radicle, and oblong seed-lobes.

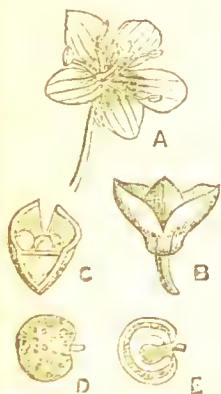


Fig. 103. *Claytonia virginica*.

GENERA AND SYNONYMES.

<i>Portulaca</i> , T.	<i>Rulingia</i> , Ehrh.	<i>Eutmon</i> , Raf.	<i>Monocosmia</i> , Fenzl.
<i>Meridiana</i> , L.	<i>Grahamia</i> , Gill.	<i>Calaudrinia</i> , Kntz.	<i>Montia</i> , Mich.
<i>Merida</i> , Neck.	<i>Xeranthus</i> , Miers	<i>Cosmia</i> , Domb.	<i>Cameraria</i> , Dill.
<i>Lamia</i> , Vand.	<i>Talinum</i> , Ad.	<i>Phacosperma</i> , [Harv.	<i>Alsinoïdes</i> , Faill.
<i>Portulacaria</i> , Jacq.	<i>Phemeranthus</i> , [Raf.	<i>Geunsia</i> , Fl. Mex.	<i>Calyptridium</i> , Nutt.
<i>Hænkia</i> , Sal.	<i>Talinastrium</i> , DC.	<i>Claytonia</i> , L.	<i>Ullucus</i> , Lozan.
<i>Anacampseros</i> , L.	<i>Talinellum</i> , DC.	<i>Limnia</i> , L.	<i>Leptrinia</i> , Raf.
<i>Telephiastrum</i> , [Dill.			<i>Lewisia</i> , Pursh.

GEOGRAPHICAL DISTRIBUTION.—These are found abundantly at the Cape of Good Hope, and in South America; they are also frequent in the northern hemisphere, beyond the tropics, penetrating even to the frozen regions.

PROPERTIES AND USES.—The only plant of any real importance, in an economical point of view, belonging to this order is the *Common Purslane* (*Portulaca oleracea*), cultivated in gardens as a salad-plant and pot-herb. It is not so much cultivated now as it formerly was, but at one time it was much used as greens, with meat or other vegetables. It is considered a cooling diuretic, and is recommended in scurvy and affections of the urinary passages. The roots of *Claytonia tuberosa* are eaten in eastern Siberia. Some species of *Talinum* are bitter and astringent, and are used as a medicine by the natives of Asia and America. *Lewisia rediviva* is a native of North America, on the west side of the Rocky Mountains, and the roots are

gathered in great quantities by the Indians, and are highly valued on account of their nutritive qualities. They are boiled and eaten as salep or arrowroot, and are admirably calculated for long journeys, two or three ounces a day being quite sufficient for a man, even while undergoing great fatigue; it is called *Tobacco root*, because, when cooked, it has the smell of tobacco. The leaves of *Talinum patens*, found plentifully by the sea shore in the West Indies and South America, are used in Brazil for the same purpose as those of Common Purslane. *Claytonia perfoliata*, a native of North America, and several species of *Calandrinia*, natives of South America, are applied to the same use, and are considered cooling and antiscorbutic in their properties. As garden flowers, many of the species of this family are highly esteemed for their great beauty.



ORDER LXXIX.—MESEMBRYACEÆ—FIG-MARIGOLDS.

Low, branching, half-shrubby, or herbaceous plants. *Leaves* opposite, or alternate, fleshy, variously shaped, without leaflets at their base. *Flowers* hermaphrodite, regular. *Calyx* adherent to the ovary, with, generally, five divisions, but varying from two to eight, equal or unequal. *Corolla* with numerous linear petals, somewhat united at the base, and inserted in the top of the tube of the calyx. *Stamens* indefinite in number, inserted with the petals, distinct. *Ovary* adherent, with from four to twenty many-ovuled cells. *Stigmas* equal in number to that of the cells of the ovary, and in the form of a crest. *Fruit* at first fleshy, afterwards woody, depressed at the summit, with from four to twenty many-seeded cells, opening in the form of a star. *Seeds* numerous, with a curved embryo lying on the outside of a more or less copious meally albumen.



Fig. 104. *Mesembryanthemum barbatum*.

GENERA AND SYNONYMES.

Mesembryanthemum, L.

Mesembryon, Ad.

Mesembryanthus, Neek.

Hymenogyne, Haw.

Glinus, L.

Rolofa, Ad.

Plenckia, Raf.

Physsa, Thours.

Doosera, Rozb.

Orygia, Forsk.

„ *Corbichonia*, Scop.

Axonotechium, Fenzl.

GEOGRAPHICAL DISTRIBUTION.—These are generally found on the hot, arid plains of Southern Africa. Some are met with on the shores of the Mediterranean, a few in Australia and South America.

PROPERTIES AND USES.—The leaves of some of the species are eaten, and others yield soda in great abundance. The leaves of *Mesembryanthemum macrorrhizum* have an aerid taste. The *Ice Plant* is *M. crystallinum*, and is known by its leaves and stem being densely covered with what are called papule, resembling globules of water, or granules of ice, which sparkle in the sun. The whole plant is without smell, and has a saline, somewhat nauseous taste. In the South of Europe, where it grows abundantly, it is gathered to furnish alkali for the glassworks. Used medicinally, it is considered diuretic and demulcent, and the expressed juice has been highly extolled as a remedy in diseases of the mucous membrane of the lungs and urinary passages, as well as in dropsy. *M. nodiflorum* is employed in the manufacture of Morocco leather, and also furnishes an abundance of alkali. *M. emarcidum* is called “kou” by the Hottentots, who beat together the whole plant, —roots, stem, and leaves,—and afterwards twist it

up like pig-tail tobacco; after which they let the mass ferment, and keep it by them for chewing, especially when they are thirsty. If it be chewed immediately after fermentation, it is narcotic and intoxicating. It is called *Canna Root* by the colonists of Cape Colony. *M. edule* is found abundantly on the sandy plains of the Cape of Good Hope, where it is called *Hottentot's Pig*, from the fruit being eaten when ripe. The leaves are also eaten, and may be pickled in vinegar, in the same way as small cucumbers, or other pickles. Its juice has been used internally, for dysentery, and thrush in children, and externally for burns. *M. geniculiflorum* is used as a potherb in Africa, and its seeds are ground to flour to make bread. The fruit of *M. acuilaterale* is called *Pigs'-faces* in Australia, and is eaten by the natives. *M. tripolium* is called *Rose of Jericho*, or *Flower of Crete*. On the approach of rain, or on being put into water, it gradually opens its seed-vessels, and looks just like a star; and, when it becomes dry, it contracts, and again closes by degrees. In this, as Thunberg remarks, we see the wisdom of an all-wise Creator, inasmuch as this plant, which is found in the most arid plains of South Africa, keeps its seeds closely locked up in time of drought; but when the rainy season comes, and the seeds can grow, it opens its capsules, and lets fall the seeds, that they may be dispersed abroad. The water in which the fruit has lain is sometimes given to native women, to procure an easy delivery in childbirth.



ORDER LXXX.—TURNERACEÆ—TURNERA FAMILY.

SMALL sub-shrubs, or herbaceous plants, with a simple pubescence.

Leaves alternate or scattered, simple, without leaflets at the base, with two glands at the apex of the leafstalks. *Flowers* hermaphrodite, regular, placed either in the axils of the leaves or on the leafstalks, Fig. B. *Calyx* with five equal lobes, imbricate in æstivation, Fig. D. *Corolla* with five petals, inserted at the throat of the calyx, and alternating with its lobes, twisted in æstivation, Fig. C. *Stamens* five, inserted at the base of the calyx, below the petals, and alternating with them. *Ovary* free, one-celled, with three partitions issuing from its inner surface. *Styles* three, distinct, more or less two-cleft, and cleft into many stigmas at the top. *Fruit* a capsule, one-celled, many-seeded, opening in three valves, which bear the seeds in their middle, along a longitudinal partition. *Seeds* with a thin, membranous aril on one side; *hilum* situated at the base of the seed. *Embryo* in the centre of a fleshy albumen, somewhat curved, with the radicle turned towards the hilum.



GENERA AND SYNONYMES.

Turnera, Plum.
Pumilea, P. Br.
Bohadschia, Presl
Piriqueta, Aub.
Burghartia, Neck.
Burkardia, Scop.

Fig. 195. *Turnera ulmifolia*.

GEOGRAPHICAL DISTRIBUTION.—These all inhabit tropical America.

PROPERTIES AND USES.—They are somewhat aromatic, and contain a mucilaginous and astringent substance, also a small portion of a sort of essential oil, which has tonic properties, but really of very little use. *Turnera ulmifolia* is considered, in tropical America, aromatic, tonic, and expectorant. *T. opifera*, which grows on the chalky hills of Brazil, is used, in the state of infusion, as a remedy against impaired digestion.

ORDER LXXXI.—PAPAYACEÆ—PAPAWS.

TREES, with an acrid, milky juice. *Leaves* alternate, palmately lobed, supported on long, nearly cylindrical branches. *Flowers* unisexual, with a monopetalous corolla, which, in the male, is tubular, with five lobes and ten stamens; the stamens all arise from the same line, and those that are opposite the lobes are sessile, the others on short filaments; in the female, the corolla is divided nearly to its base into five segments. *Ovary* superior, one-celled, with five many-ovuled parietal placentas. *Stigma* sessile, five-lobed, lacerated. *Fruit* succulent, unopening, one-celled, with five many-seeded parietal placentas. *Seeds* enveloped in a loose mucous coat, with a brittle, pitted testa. *Embryo* in the axis of its fleshy albumen, with flat seed-lobes and a cylindrical radicle turned towards the hilum.

Fig. 106. *Carica papaya*.

GENERA AND SYNONYME.

Carica, L.*Papaya*, T.*Vasconcella*, St. Hil.

GEOGRAPHICAL DISTRIBUTION.—These are all indigenous to tropical America, but they have been introduced to and are cultivated in Africa and the East Indies.

PROPERTIES AND USES.—The *Papaw Tree* (*Carica papaya*) is cultivated for the sake of its fruit, which is eaten when cooked, and has a pleasant, sweetish taste. When young, it is generally used for sauce; and when boiled and mixed with lime-juice, it is used as a substitute for apples, to which, in flavour, it has a resemblance. The juice of the unripe fruit is a powerful and efficient vermifuge, and the powder of the seeds answers the same purpose. The principal constituent of the juice is fibrine, a principle hitherto supposed to belong to the animal kingdom and to the fungi. Water impregnated with this juice renders all sorts of meat steeped in it tender, and even the flesh of old hogs and old poultry fed on the leaves and fruit is thus made perfectly tender, but must be eaten as soon as killed, otherwise it will run to putridity. Even the vapour of the tree answers the same purpose, and hence people hang joints of meat, fowls, &c., in the upper part of the tree to prepare them for table. *C. digitata* is regarded by the natives of Brazil as a deadly poison. The juice, applied to the skin, causes itching and blisters; and the fruit, though beautiful in colour and shape, is not touched by any animal except a species of ant, although not at all poisonous.

ORDER LXXXII.—PASSIFLORACEÆ—PASSION FLOWERS.

HERBACEOUS or half-shrubby plants, frequently climbing, and furnished



Fig. 107. *Tacsonia manicata*.

with tendrils which proceed from the axils of the leaves. *Leaves* alternate, simple, and variously lobed, generally with glands on the leaf stalks, and two leaflets at their base, but which are wanting in *Malesherbia*. *Flowers* hermaphrodite, regular, very rarely unisexual. *Calyx* coloured, with five, eight, or twelve deep divisions, arranged in two series, the exterior sometimes green on the outside. *Corolla* generally furnished at the throat with a circle of threads, which are either distinct or united into a tube; it is rarely wanting, but if so, replaced by the interior series of the divisions of the calyx. *Stamens*

equal in number to the external divisions of the calyx, generally five, rarely

more numerous, inserted at the base of the tube of the calyx, either distinct or united into a tube, which sheathes the stalk of the ovary, and, as it were, elevates it above the flower. *Anthers* two-celled, turned outwards; or versatile, as in *Malesherbia*. *Ovary* free, elevated on a stalk, one-celled, with from three to five longitudinal parietal placentas. *Styles* three to five, either distinct or adnate at the base. *Stigmas* thick and clove-like. *Fruit* fleshy or capsular, with three parietal placentas, sometimes three-valved, unopening. *Seeds* numerous, with a brittle skin, and with or without a fleshy seed-coat. *Embryo* in the axis of fleshy albumen, with a round radicle next the hilum, and flat leafy seed-lobes.

SUB-CLASS I.—PASSIFLOREÆ.

Leafstalks with two leaflets at their base. Petals five, but occasionally wanting. Stamens united into a tube; anthers turned outwards. Styles inserted at the same point. Seeds covered with a fleshy seed-coat.

TRIBE 1. *Paropsicæ*.—Petals five. Ovary sessile. Upright shrubs without tendrils.

GENERA AND SYNONYMS.

<i>Ryania</i> , Vahl.	<i>Bülowia</i> , Schum.
<i>Patrisia</i> , L. C. Rich.	<i>Paropsia</i> , Noronh.
<i>Smeathmannia</i> , Sal.	

TRIBE 2. *Passifloridæ*.—Calyx with five divisions. Petals five, or wanting. Ovary elevated on a stalk. Generally climbing-plants furnished with tendrils.

GENERA AND SYNONYMS.

<i>Thompsonia</i> , R. Br.	„ <i>Astephananthes</i> ,	<i>Dysosmia</i> , DC.	<i>Tacsonia</i> , Juss.
<i>Deidamia</i> , Thou.	[<i>Bory</i> .	<i>Astropheca</i> , DC.	<i>Eutaacsonia</i> , Endl.
<i>Passiflora</i> , Juss.	<i>Monactinisma</i> ,	<i>Murucuja</i> , T.	<i>Distephana</i> , Juss.
<i>Granadilla</i> , T.	[<i>Bory</i> .	<i>Pentaria</i> , DC.	<i>Distephia</i> , Sal.
<i>Tetrapatheca</i> , DC.	<i>Balduina</i> , Raf.	<i>Decaria</i> , DC.	<i>Varcea</i> , Gært.
<i>Cicca</i> , Medik.	<i>Decaloba</i> , DC.	<i>Disemma</i> , Labill.	<i>Crossostemma</i> Pleh.
	<i>Anthactinia</i> Bory		

TRIBE 3. *Modeceæ*.—Flowers unisexual.

GENERA AND SYNONYMS.

<i>Modecca</i> , L.	<i>Pascanthus</i> , Burch.	<i>Acharia</i> , Th.
<i>Microblepharis</i> , W & A	<i>Kolbia</i> , Palis.	<i>Botrysicyos</i> , Hochst.
<i>Blepharanthus</i> , Sm.	<i>Ceratiocyos</i> , Nees.	

SUB-CLASS II.—MALESHERBEE.

Leafstalks without leaflets at their base. Petals five. Stamens either distinct or united. Anthers turning as it were on a pivot. Styles inserted at distant points on the ovary. Seeds without a seed-coat.

GENERA.

Malesherbia, Ruiz. & Pav.
Gynopleura, Cav.

GEOGRAPHICAL DISTRIBUTION.—The greater part of the plants forming this family are found in America, between the tropics; a few are met with in the warm parts north of the tropics, but very few to the south. In tropical Africa, and in the warm parts of Asia, they are rare. Some are found in New Holland and New Zealand.

PROPERTIES AND USES.—The Passion Flowers not only commend themselves by the beauty and form of their flowers, but also by the agreeable flavour of their fruit, some of which are even applied to medicinal purposes.

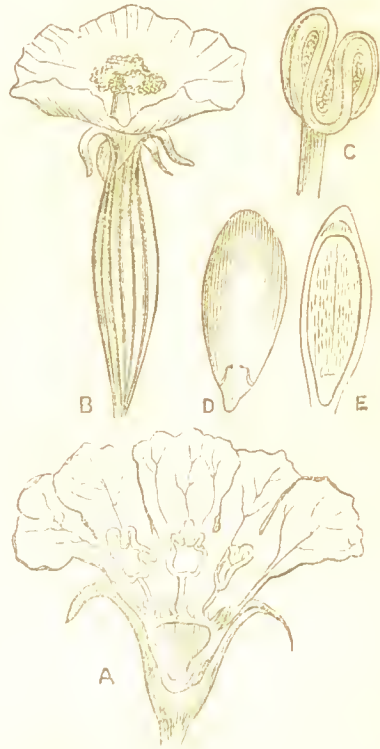
The fruit of *Passiflora maliformis*, called the *Apple-fruited Granadilla* or *Sweet Calabash*, is about two inches in diameter, of a dingy-yellow colour when ripe. The coat is hard and stringy, nearly a quarter of an inch in thickness, full of a very agreeable gelatinous pale-yellow pulp, which is eaten with wine and sugar. *P. quadrangularis* is the *Common Granadilla*, or *Granadilla Vine*. It is a native of Jamaica and South America, and produces a large fruit of an oblong shape, six inches in diameter and fifteen inches in circumference. The skin is of a greenish-yellow colour, and, when ripe, soft, leathery, and very thick, but contains a succulent pulp of a purple colour, which is the eatable part. The flavour is sweet and slightly acid, and is very pleasant to the taste, especially in a hot climate. It is generally eaten with wine and sugar. The root is said to be very poisonous; in small doses it is anthelmintic, but when taken largely it causes vomiting, convulsions, paralysis, and ultimately death. The active principle has been called *Passiflorine*, and is somewhat similar to morphine. *P. laurifolia* is the *Laurel-leaved Granadilla*, and is found in the West India Islands, where it is called by the French *Pomme de Liane*, and by the English *Honeysuckle* and *Water Lemon*. In South America it is called *Murucuja* and *Granadilla*. It is very much cultivated all through South America for the sake of its fruit, which is about the size of a hen's egg, but rather more elongated, and tapering equally at both ends; when ripe, it is yellow and dotted over with white spots. It contains a whitish watery pulp, which, in the West Indies, is usually sucked through a small hole made in the rind, which is tough, soft, and thin; the juice has a peculiar aromatic flavour, and delicately acid. It is very agreeable to the taste, and is much relished by Europeans, as well as by the natives. It quenches thirst, allays heat, induces an appetite, and elevates the spirits. The leaves are bitter, and are considered moderately astringent and anthelmintic. The fruit of *P. incarnata* is orange-coloured, about the size of an apple, and with a sweetish, yellow pulp; and the juice of the leaves, and of those of *P. pallida* and *P. maliformis*, is used by the Brazilians against intermittent fevers. The fruit of *P. edulis* is two inches long, and an inch and a half in diameter, of a livid purple colour on the outside, with an orange-coloured pulp. It has a flavour somewhat like that of the orange, with a mixture of acid. *P. cærulea* is hardy in the southern parts of this country, and is frequently grown against walls and houses, and as a covering to arbours. Its fruit is about the size of a hen's egg, and yellow when ripe, but they are not eaten. In the Caribbee islands, narcotic properties are attributed to *P. rubra*. *P. capsularis* is believed to possess emmenagogue properties; and an extract of the leaves of *P. alata*, mixed with aloes, is said to be beneficial in atrophy. The root of *P. contrayerva* is sweetish, somewhat pungent and fragrant, and is considered a powerful counter-poison, deobstruent, and cordial. *P.*

fœtida is recommended for its antispastic properties, and as an addition to fomentations and cataplasms. *Murucuja ocellata*, a native of the West India islands, is esteemed for its anthelmintic, diaphoretic, and antihysterical virtues. It produces a flesh-coloured berry, of the size of a pigeon's egg. Both the syrup and decoction of the plant are much used in Jamaica, where it is frequent; and it is said to answer effectually all the purposes for which syrups of poppies and laudanum are administered. The flowers are infused in, or powdered and mixed with, wine or spirits, and the composition is considered a very effectual and easy narcotic, and is called *Bull-hoof* or *Dutchman's laudanum*. The root of *Modecca palmata*, bruised and cooked with oil, is said to be tonic; and the expressed juice, mixed with the milk of the cocoa-nut, removes tightness in the chest. From the bark of the root, mixed with honey, an electuary is formed, which is good against coughs. *M. integrifolia*, beaten up with butter, heals hemorrhoids. In the sub-class Mallesherbæ there are not any plants which are known to possess any properties.



ORDER LXXXIII.—CUCURBITACEÆ—CUCUMBERTS.

HERBACEOUS, or rarely half-shrubby plants, with a climbing or rambling growth, and furnished with tendrils. *Leaves* alternate, entire or lobed, succulent, and covered with numerous asperities. *Flowers* regular, monœceous or dioecious, rarely hermaphrodite. *Calyx* with five lobes. *Corolla* sometimes with five distinct petals, but usually they are united; distinct from the calyx, rising from the margin of the disk. *Stamens* five, distinct, united either in one or three bundles; *anthers* one to two-celled, very long and twisting, Fig. C, rarely ovate, and short, and turned outwards. *Ovary* inferior, with three or five cells, subdivided in two by the turning in of the partitions. *Style* rarely almost wanting, crowned by three to five two-lobed stigmas, which are thick and velvety, but rarely fringed. *Fruit* a sort of berry, or capsule, variable in form; long and flexible, as in the Snake Cucumber; large and round, as in the pumpkins; or opening sometimes by an aperture at the end of the fruit, through which the seeds are squirted to a considerable distance, as in the Squinting Cucumber. The *seeds* are embedded in a sort of pulp, flat, and without albumen, Fig. D. *Embryo* with leafy seed-lobes, and a radicle directed towards the hilum, Fig. E.

Fig. 108. *Cucumis sativus*.

SUB-ORDER I.—NHANDIROBEE.

Anthers short, ovate, turned outwards, one to two-celled, with the cells adnate, distinct, and bursting longitudinally.

GENERA AND SYNONYMS.

Fevillea, L.
Fauillea, Pers.
Fevillea, Sm.
Nhandiroba, Pl.

Zanonia, L.
Alsomitra, Bl.
Gomphogene, Griff.
Euklya, Griff.

SUB-ORDER II.—CUCURBITEE.

Anthers long and twisting, Fig. C.

TRIBE I. *Telfaireæ*.—Seeds attached to the margin of the placenta, which extend from the axis of the fruit inwards, but do not touch the inner surface of the pericarp.

GENERA AND SYNONYMES.

Telfairia, Hook.	Pestalozzia, Zoll.	Anisosperma, Mans.
Joliffia, Boj.	Actinostemma, Griff.	Hypanthera, Mans.
Ampelosieyos Thouars		

TRIBE 2. Cucurbitidæ.—Placentæ extending from the axis of the fruit even to the inner-surface of the pericarp, when they turn inwards, bearing the seeds on their margin.

GENERA AND SYNONYMES.

Coniandra, Schrad.	Dielidostigma, Kze.	Muricia, Lour.	Ceratosanthes,
Cyrtonema, Schrad	Schizostigma, Arn.	Neurosperma Raf	[Juss.
Melothria, L.	Cucurbitella,	Adenopus, Benth.	Anguina, Mich.
Sicydium, Schl.	[Walpr.	Luffa, T.	Involucraria, Ser.
Zehneria, Endl.	Trianosperma, T & G	Turia, Forsk.	Elaterium, Jacq.
Pilogyne, Schr.	Alternasemina,	Trevouxia, Scop.	Momordica, Neck
Æchunandra, Arn.	[Mans.	Benincasa, Savi.	Apodanthera, Arn.
Bryonopsis, Arn.	Wilbrandia, Mans.	Lagenaria, Ser.	Gymnopetalum Arn
Anguria, L.	Cayaponia, Mans.	Cucumis, L.	Echinocystis, T & G.
Psiguria, Neck.	Citrullus, Neck.	Melo, T.	Cephalandra, Schr.
Rhynchocharpa, Schr	Colocynthis, T.	Cucurbita, L.	Cyclanthera, Schr
Karivia, Arn.	Rigocarpus, Neck	Pepo, T.	Discanthera, T & G.
Mukia, Arn.	Eebalium, L C Rich	Melopepo, T.	Schizocarpum, Schr
Bryonia, L.	Momordica, L.	Pileocalyx, Gasp.	Sphenantha, Schr.
? Solena, Lour.	Elaterium, T.	Coccinia, W. & A.	Rytidostylis, H & A.
? Cucumeroides,	Amordica, Neck.	Trichosanthes, L.	Mackaya, Arn.
[Gürt.	Poppya, Neck.		

TRIBE 3. Sicyoidæ.—Ovary one-celled. Ovule solitary, suspended from the top of the cell.

GENERA AND SYNONYMES.

Sicyos, L.	Badaroa, Berter.	Chayota, Jacq.
Sicyoides, T.	Sechium, P. Br.	Gynostemma, Bl.

DOUBTFUL GENERA.

Erythropalum, Bl.	Allasca, Lour.	Gronovia, L.
Zucca, Comm.	Thladiantha, Bunge.	Pentacelthra, Bert.

GEOGRAPHICAL DISTRIBUTION.—The Cucurbits are found in the tropical and warmer regions of the whole world; in the temperate zone they are rare, and are not known in the frigid zone. The greatest number is found on the continent of Hindostan; and in America they are not at all frequent.

PROPERTIES AND USES.—Of these many supply useful articles of consumption for food, and others are actively medicinal in their virtues. Although all possess a similar action on the animal economy, still there are some which exhibit great anomalies. The root of those which are perennial contain, besides fecula, which is their base, a resinous, acrid, and bitter principle, which is purgative and even drastic, as in Bryonia and Eebalium. This property is also found in the pulp of the Colocynth, which forms a remarkable exception in this family, where, in general, the fruits have the flesh sweet, sugary, and more or less melting and perfumed, as we find in the Melons, Gourds, Cucumbers, Vegetable Marrows, and Squashes. But it may be remarked that even these, of which we make such general use, are

slightly laxative, when eaten in too large a quantity. In tropical countries, this order gives the inhabitants a large portion of their food, which it often affords of the finest quality, in the most arid deserts, or on barren swamps or islands. In Persia, China, and Cashmere, they are cultivated on the lakes, on the floating collections of weeds common in these localities. In India they are everywhere abundant, either in the wild or cultivated state. The seeds of all the family are sweet and mucilaginous. They contain, besides mucilage, a certain quantity of fixed oil; and they are employed in the preparation of emollient emulsions, with special action on the bladder. The seeds of *Fevillea cordifolia* and *F. trifoliata* contain a great quantity of bitter oil, which, in small doses, is an excellent and safe purgative, and is also used by the Brazilians to burn in lamps. In Brazil they are considered an effectual remedy against the bites of poisonous serpents, and particularly as an antidote to the poison of *Rhus toxicodendron*, *Mancinella*, and *Spigelia*, when fresh and bruised in water. The leaves of *F. cordifolia* are said to possess the same properties. The berries of *Zanonia indica*, called *Bandolier fruit*, have the taste and smell of the cucumber, and the bruised leaves are mixed in baths, and, beaten up with butter, form an antispasmodic liniment.

Cucurbitææ.—The fruit of *Melothria pendula* is about the size of a pea, and is pickled, when green, by the inhabitants of the West Indies; and that of *Anguria pedatisecta* is used by the Peruvians in soups. The *Common Bryony* (*Bryonia dioica*), so plentiful in the hedges of this country, is called *White Bryony*, *Tetter-berries*, *Wild Hops*, *Wild Vine*, and *Wild Nep*. The roots are of an immense size, sometimes a foot to two feet long, thick as a man's arm, white, succulent, and fleshy, with a bitter, acrid, and disagreeable taste. It is an active hydragogue, cathartic in large doses, sometimes proving emetic, and, if too largely administered, causes inflammation of the alimentary mucuous membrane. The fresh root is highly irritant; bruised and applied to the skin, it is capable of producing blisters, and, if laid on the abdomen, it moves the bowels. Besides a peculiar bitter principle, called *Bryonin*, the root contains starch in considerable proportion, gum, resin, sugar, a concrete oil, albumen, and various salts. It has been used with success in dropsy, hysteria, paralysis, and some other chronic diseases. The berries are also purgative, and are used in dyeing. *B. americana* and *B. africana* possess the same properties. The root of *B. abyssinica* is eaten, when cooked, without any disagreeable consequences. The root of *B. epigæa*, a native of Java, was once supposed to be the famous Colombo root. It is administered by the native practitioners of India, in the state of powder, as an aperient and alterative. The root of *B. rostrata*, a native of Tranquebar, is prescribed in India as an astringent and emollient poultice, and also as an electuary, taken internally, in cases of piles. The shoots and leaves of *B. scabra* are aperient, and the fruit is bitter. The bitter seeds of *B. callosa* are given as an anthelmintic, and also yield a fixed oil, used for burning in lamps. The juice of the leaves of *B. grandis* is used as an application to obstinate ulcers produced by the bites of animals.

Citrullus colocynthis furnishes the drug called *Colocynth*. It is a native of Turkey, and various parts of Asia, as in Lower India, and it is also found at the Cape of Good Hope. The fruit is about the size of an orange, yellow and smooth when ripe, and contains a white, spongy matter, which

is the part used in medicine, after being freed from the seeds which are imbedded in it. The fruit is gathered in autumn, when it begins to turn yellow, and, after being peeled, is quickly dried either in a stove or by the sun, and thus prepared it is exported from the Levant. This pulp of colocynth is a powerful drastic, hydragogue purgative, producing, when given in large doses, violent griping, and sometimes bloody discharges, with dangerous inflammation of the bowels. It contains a bitter principle, called *Colocynthin*, which is a yellowish brown substance, somewhat translucent, brittle and friable; fusible at a temperature below the boiling-point of water; inflammable; more soluble in alcohol than in water, but capable of imparting to the latter an intense bitterness. The seeds of Colocynth are somewhat bitter, but possess little activity, and are even used as food in Northern Africa. Thunberg states that the fruit is said to be eaten by the Hottentots, and even by the colonists at the Cape of Good Hope, after being pickled with vinegar, although they taste very bitter.

The drug called *Elaterium* is obtained from *Ecballium agreste*. This is a native of the south of Europe, and is better known as the *Squirling Cucumber*, under which name it is extensively cultivated in the herb-gardens at Mitcham in Surrey. The fruit is like a small oval cucumber, about an inch and a half long and an inch in diameter, and is covered with stiff hairs or prickles. When fully ripe, it separates from the stalk, and throws out its juice and seed with considerable force through an opening at the base, where it was united to the stalk; it is from this circumstance that the name is derived. When the fruit is sliced and placed upon a sieve, a perfectly limpid and colourless juice flows out, which after a short time becomes turbid, and in the course of a few hours begins to deposit a sediment. This, when collected and carefully dried, is very light and pulverulent, of a yellowish-white colour slightly tinged with green; and this is genuine elaterium, which will purge violently in the dose of one-eighth of a grain. The mode in which it is obtained at Mitcham is, to slice the fruit longitudinally in halves, and then press it with considerable force, wrapped in a hempen cloth, with a common screw-press. The juice is then strained through a hair or wire sieve, and set aside to deposit, which usually is completed in three or four hours. The liquor is then carefully poured off, the deposit is placed on calico cloths resting on hair sieves, and allowed to drain for about twelve hours, after which it is removed with a knife, spread over small cloths, and dried on canvas frames in a drying-stove. About half an ounce of elaterium is obtained from forty pounds of the fruit. Elaterium is a powerful hydragogue cathartic, and, in a large dose, generally excites nausea and vomiting. If too freely used, it acts with great violence both upon the stomach and bowels, producing inflammation of these organs, which has in some instances proved fatal.

Momordica balsamea, or *Balsam Apple*, grows in Syria, and is famous for curing wounds. The unripe fruit is infused in sweet oil, and exposed to the sun some days till it becomes red. This, applied on cotton to a fresh wound, is esteemed by the Syrians next to Balsam of Mecca. The plant is also used to form arbours. *M. mixta*, called in India *Gol-kakra*, produces a large, red, and thorny fruit, containing a yellow insipid pulp, totally inert as a medicine, and is occasionally used for food in Bengal. *M. echinata* produces a round fruit covered with bristles, the size and appearance of a large

hairy gooseberry. It is sometimes seen in Covent Garden under the name of *Gooseberry Gourd*, and is pickled when green, as cucumbers are, in vinegar. The unripe fruit of some species of *Luffa* are enumerated as furnishing a daily food among the Arabians and Indians; but when ripe, they are powerfully purging. Among these are *L. acutangula* and *L. aegyptiaca*, which is called by the Arabians *Liff*, or *Louff*, the fruit of which is made into a pickle, like the mango, but has a disagreeable flavour, and not accounted very wholesome. *Benincasa cerifera* secretes a waxy substance on the surface of its fruit, like the bloom which is found on plums and other fruits. Both it and *B. cylindrica* produce long cylindrical fruit like a cucumber, which are eatable when cooked or served like cucumbers. The *Bottle Gourd* (*Lagenaria vulgaris*) produces fruit like a bottle, some of which are as much as six feet long, with a roundish bottom and neck. The rind, when dry, becomes hard, of a pale-bay colour, and holds water. There are several varieties of the Bottle Gourd, the most remarkable of which are *L. v. gourda*, which is called *Pilgrim's Bottle Gourd*, and has two unequal ventricosities, the one larger than the other, and a contracted neck dividing them. *L. v. gougourda* has the fruit ventricose at the base, and an oblong neck. *L. v. clavata*, or *Trumpet Gourd*, has a less developed ventricosity than the others, and a long curved neck. It is sometimes also called the *Club Gourd*. In both the Indies, bottle gourds are commonly cultivated and sold in the markets, and form the principal food of the inhabitants during June, July, and August. The Arabians call it *Charrah*, and the natives boil it and season with vinegar; sometimes they fill the shell with rice and meat, and make a pudding of it. In Jamaica and many other parts between the tropics, the shells are generally used for holding water or palm wine, serving as bottles, under the name of calabashes. The pulp of the fruit is often employed in resolute poultices. It is bitter and purgative, and may be used instead of colocynth. The fruit of *L. idolatrica* is held in great veneration by the Hindoos in their religious ceremonies.

The *Melon* is *Cucumis melo*, so highly esteemed for its rich and delicious fruit. It was originally brought to this country from Jamaica, and has been cultivated in England since 1570. It was formerly called *Musk-Melon*. The common *Cucumber* is *C. sativus*, and is too well known to require any description. *C. chate* is a native of Egypt and Arabia, and produces a fruit of almost the same substance with the melon. The taste is somewhat sweet, and as cool as the water-melon. The upper classes and Europeans in Egypt consider it the most pleasant fruit they have, and that from which they have to apprehend the smallest inconvenience. *C. dudaim*, or, as it has been called, *Queen Anne's Pocket Melon*, is a native of Persia, and produces a fruit variegated with green and orange, and oblong unequal green spots; when fully ripe, it becomes yellow and then whitish. It has a very fragrant, vinous, musky smell, and a whitish, flaccid, insipid pulp. *Dudaim* is the Hebrew name of the fruit, rendered *mandrake* in Scripture. *C. conomon* is cultivated everywhere in Japan, for the sake of its fruit, which, when preserved, is sold under the name of *Connemon*, and is an ordinary food among the Japanese. The fruit of *C. anguria* is eaten green by the inhabitants of the West India Islands, but is far inferior to the common cucumber. The fruit seldom grows as large as a pullet's egg, and is shaped like it, the rind being closely set with blunt prickles. It is frequently used

in the sugar islands with other herbs in soups, in which it is esteemed an agreeable and wholesome ingredient. *C. flexuosus* is the *Snake Cucumber*; it grows to a great length, and may be used either raw or pickled. *C. citrullus* is the *Water Melon*, a native of tropical Africa and the East Indies. This plant serves both for food, drink, and physie to the Egyptians. It is eaten in abundance during the season, which is from the beginning of May until the end of July. It is the only medicine the common people use in ardent fevers; when it is ripe or almost putrid, they collect the juice and mix it with rose-water and a little sugar. The fruit should be eaten cautiously by Europeans, especially when taken in the heat of the day; but it is much used within the tropics and in Italy. The seeds are employed to a considerable extent as a domestic remedy in stranguary and other affections of the urinary passages, and they are esteemed by some as diuretic. *C. utilissimus* is found in Bengal, where it is cultivated by the natives, and called *Kaukoor*. When young and about half-grown, the fruit is oblong and downy, and is pickled; but when fully grown, it is from four to six inches long and three or four in diameter, with a smooth yellow skin. When cut, they have much the flavour of the melon, and will keep for several months if carefully kept without being bruised; they are, in this state, eaten raw, and much used in curries by the natives. The natives dry the seeds and grind them into a meal, which they employ as an article of diet; they also express a mild oil from them, which they burn in lamps. The powder of the toasted seeds, mixed with sugar, is said to be a powerful diuretic, and serviceable in promoting the passage of sand and gravel. The fruit of *C. Hardwickii* and *C. pseudocolocynthis* have the same properties as colocynth, and are used as a substitute for it.

The *Great Gourd* (*Cucurbita maxima*) sometimes produces fruit of an immense size, there being instances on record where they have been grown in this country weighing 212 lbs., and measuring eight feet in circumference. We have ourselves seen them upwards of 170 lbs. in weight. This and its varieties are always round and depressed, like a much-flattened orange, with an indentation at the stalk and flower ends, and generally ribbed. The French call it *Potiron*. It is used in soups. The *Pumpkin*, or *Pompion*, called by the French *Citrouille*, is *C. pepo*. The fruit of this is generally oblong, or inclining to oblong, and very much smaller than the preceding. There are a great number of varieties of it cultivated in gardens, both for ornament and also for culinary use. They are used cut up in soups, in the same way as turnips are; and they also make very excellent pies, which are much relished by some, the quality depending very much on the mode of cooking. When the fruit is ripe, some cut a hole on one side, and, having taken out the seeds, fill the void with sliced apples, adding a little sugar and spice, and then, having baked the whole, eat it with butter. It may also be used fried in oil or butter. The *Squashes* so extensively grown in America are *C. melopepo*. They are always flat, and have prominent angles or ribs on their sides; that which is called *Turk's Cap*, and is variously coloured like a turban, belongs to this species. *C. ovifera* is *Vegetable Marrow*, now so extensively grown and generally used. Some of the gourds are entirely covered with large warts, and are called *Warted Gourds*. They are varieties of *C. verrucosa*, and vary in size and shape, being round, flat, pear-shaped, and bottle-shaped. The Americans use them, when

about half-grown, as a sauce to their meat. The *Orange Gourd*, which is of the size, shape, and colour of an orange, is *C. aurantia*, and may also be eaten like the others. When trained up a pole or against a wall, and covered with its beautiful orange fruit, it makes an ornamental plant.

The fruit of *Coccinia indica* which is quite red, is eaten by the natives of India in their curries. Although the rind of the fruit of *Tricosanthes palmata* is exceedingly bitter, it has been proved to possess neither purgative, tonic, nor aperient properties; but Dr. Ainslie states that, made into a paste with cocoa-nut oil, it is used in India as an application to the sores which often form behind the ears. It is also introduced into the nostrils in cases of ozæna. The seeds of *T. amara* are bitter, astringent, and sometimes emetic. The fruit of *T. villosa* acts like colocynth; and the root of *T. cordata* is used in India as a substitute for Colombo-root. The seeds of *T. cucumerina* are used in Java in diseases of the stomach and bowels, and the fruit is considered anthelmintic. The alcoholic extract of the unripe fruit of *T. dioica* is said to be a safe and powerful cathartic in doses of from three to five grains, repeated every third hour till the desired effect is produced. In the old *Materia Medica*, what was called *The Greater Cold Seeds* were those of the Pumpkin, the Gourd, the Melon, and the Cucumber. These, when bruised and rubbed up with water, form an emulsion, which was formerly thought to possess considerable virtues, and was much used in catarrhal affections, disorders of the bowels and urinary passages, fevers, &c.; but they have been superseded by other more agreeable demulcents.

Sicyoidæ.—The only plant of this tribe which commends itself to our notice is *Sechium edule*, or *choko*, as it is called in South America. The fruit is green, shining on the outside, whitish and fleshy within, varying in size. Each contains one seed, which is placed at the very top of the fruit, and is sometimes an inch long; when it is ripe it protrudes a little, and puts forth many fibres at the extremity. In many of the West India islands, the inhabitants use the fruit in soups and puddings, or boil and eat it with their meat, as a substitute for greens and turnips, in which state it is regarded as wholesome and refreshing, but it is too insipid to be much cultivated. There are two varieties of this found in Cuba; one with soft bristles over its surface, and the other quite smooth.

Telfaireæ.—*Telfairia pedata* is a climbing plant, a native of Zamgibar, on the east coast of Africa, and produces fruit three feet long, and eight or ten inches in diameter. It is full of seeds, each containing as many as two hundred and sixty-four, as large as chesnuts, which are as excellent as almonds, and have a very agreeable flavour; when preserved they yield an abundance of oil, equal to that of the finest olives.

ORDER LXXXIV.—LOASACEÆ—CHILI NETTLES.

HERBACEOUS plants, more or less covered, with stinging hairs, which secrete an acrid juice. *Leaves* opposite or alternate, without leaflets at their base. *Flowers* hermaphrodite, regular. *Calyx* tubular, with four or five lobes, adhering to or closely girding the ovary. *Corolla* with four or five concave petals, inserted in the throat of the calyx, or double that number, and disposed in two series, the interior being the shortest, and sometimes in the form of scales. *Stamens* indefinite in number, distinct, or united at the base in several bundles. *Ovary* inferior, one-celled, with three, four, or five partitions, issuing from its inner surface. *Style* simple. *Stigma* either entire or four-lobed. *Fruit* a capsule, one-celled and many-seeded, crowned by the calyx, opening by three, four, or five valves. *Seeds* numerous, without seed-coat. *Embryo* in the axis of fleshy albumen, with the radicle pointing to the hilum, and with small, flat cotyledons.

Fig. 109. *Loaza Placii*.

GENERA AND SYNONYMES.

<i>Acerolasia</i> , Presl.	<i>Ancyrostemma</i> , Pöp.	<i>Cajophora</i> , Presl.
<i>Mentzelia</i> , L.	<i>Bartonia</i> , Sims.	<i>Raphisanthe</i> , Lilja.
<i>Creolobus</i> , Lilja	<i>Klaprothia</i> , H. B. K.	<i>Blumenbachia</i> , Schrd.
<i>Eumentzelia</i> , T. & G.	<i>Sclerotherix</i> , Prl.	<i>Gymnotheca</i> , Denc.
<i>Chrysostoma</i> , Lilja.	<i>Grammatocarpus</i> , Presl	<i>Fissenia</i> , R. Br.
<i>Trachyphytum</i> , Nutt.	<i>Scyphanthus</i> , Don.	<i>Cevallia</i> , Legasc.
<i>Microsperma</i> , Hook.	<i>Loasa</i> , Ad.	<i>Petalanthera</i> , Torr.
<i>Euenide</i> , Zucc.		

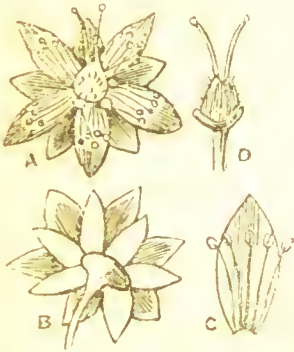
GEOGRAPHICAL DISTRIBUTION.—These are found over the whole continent of America, except in the extreme north. They are frequent on the shores of the Pacific, and abundant in the southern tropics.

PROPERTIES AND USES.—These are all covered with stinging hairs. The root of *Mentzelia hispida*, a native of Mexico, is powerfully purgative, but there are none of the others which possess any useful properties.

ORDER LXXXV.—HOMALIACEÆ—THE HOMALIUM FAMILY.

SHRUBS or small trees.

Leaves alternate, simple, with deciduous leaflets at their base. *Flowers* hermaphrodite, regular, arranged in spikes, racemes, or panicles. *Calyx* tubular, adherent to the ovary, with ten to fifteen lobes. *Corolla* with five to ten petals, alternating with the lobes of the calyx, and with glandular appendages, generally on their inner surface, at their base. *Stamens* sometimes equal in number to the lobes of the calyx, and then opposite them; at other times they are more numerous, and collected into bundles. *Ovary* inferior, with a single cell, containing a great number of ovules, attached to three or five partitions, which proceed from its inner surface. *Styles* equal in number to the partitions, and terminated by a single stigma. *Fruit* sometimes capsular, sometimes fleshy, one-celled. *Seeds* with an embryo in the axis of fleshy albumen, leafy seed-lobes, the radicle superior,

Fig. 110. *Homalium racemosum*.

and next to the hilum.

GENERA AND SYNONYMES.

Homalium, Jacq.
Acoma, Ad.
Napimoga, Aubl.
Tattia, Scop.
Racoubea, Aub.
Lagunczia, Scop.

Blackwellia, Comm.
Vermontea, Comm.
Asteranthus, Lour.
Pythagorea, Lour.
Anetia, Endl.
Byrsanthus, Gussl.

Eriudaphus, Nees.
Trimeria, Harv.
Myriantheia, Thouars.
Nisa, Noronh.
Dissomeria, Benth.
Asteropeia, Thours.

GEOGRAPHICAL DISTRIBUTION.—None of this family are found in abundance anywhere. They are met with in the tropics of America, north of the equator; between the tropics on the continent of Africa, at the Cape of Good Hope, the Isles of Bourbon and Madagascar, and they have also been observed in the warmer parts of Asia. The greatest number are found in Africa. There are only two species of *Homalium* met with in America; the *Blackwelliæ* inhabit Africa and Asia, and all the rest belong to Africa.

PROPERTIES AND USES.—The only species which possess any properties are *Homalium racemosum* and *H. Racoubea*, the roots of which are astringent, and employed by the natives as a remedy against blennorrhœa.

ORDER LXXXVI.—CACTACEÆ—INDIAN FIGS.

SHRUBS or trees, with a peculiar and very variable habit. The *Stem* is succulent, either angular or flattened, often depressed, hemispherical, or globular, and furnished with prominent angles or tubercles; with or without spines, and usually jointed. *Leaves* generally wanting, sometimes replaced by a cushion (pulvinus) situated on the stem, as in *Cereus*; rarely perfect, flat, simple, and stalked, as in *Pereskia*. *Flowers* hermaphrodite, regular. *Calyx* with numerous lobes, the exterior of which are small, the inferior like petals. *Corolla* with very numerous petals. *Stamens* indefinite in number, inserted along with the petals in the orifice of the calyx. *Ovary* inferior, one-celled, with three or many seed-bearers adhering to its inner surface. *Style* simple, very long, terminated by many stigmas equal in number to that of the seed-bearers (placentæ). *Fruit* fleshy, one-celled, many-seeded, either smooth and crowned by the calyx, or covered with scales, scars, or tubercles. *Seeds* imbedded in the pulp, without albumen. *Embryo* either

Fig. 111. *Opuntia Salmiana*.

straight, curved, or spiral, with a short, thick, obtuse radicle, and flat, thick seed-lobes.

TRIBE 1. *Melocactææ*.

GENERA AND SYNONYMES.

<i>Melocactus</i> , <i>T.</i>	<i>Anhalonium</i> , <i>Lem.</i>	<i>Mamillaria</i> , <i>Haw.</i>
<i>Cactus</i> , <i>Haw.</i>	<i>Ariocarpus</i> , <i>Schied.</i>	<i>Leuchtenbergia</i> , <i>Salm.</i>

TRIBE 2. *Echinocactææ*.

GENERA.

<i>Discocactus</i> , <i>Pfeiff.</i>	<i>Echinocactus</i> , <i>L. & O.</i>	<i>Pelecyphora</i> , <i>Erhemb.</i>
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TRIBE 3. *Cereideæ*.

GENERA AND SYNONYMES.

<i>Astrophytum</i> , <i>Lem.</i>	<i>Echinonyctanthus</i> , <i>Lem.</i>	<i>Cephalophorus</i> , <i>Lem.</i>
<i>Echinopsis</i> , <i>Zucc.</i>	<i>Pilocereus</i> , <i>Lem.</i>	<i>Cereus</i> , <i>Haw.</i>
	<i>Cephalocereus</i> , <i>Pfeiff.</i>	<i>Cirinosum</i> , <i>Neck.</i>

TRIBE 4. *Phyllanthææ*.

GENERA AND SYNONYMES.

<i>Phyllocactus</i> , <i>Link.</i>	<i>Phyllanthus</i> , <i>Miq.</i>
<i>Phyllarthus</i> , <i>Neck.</i>	<i>Epiphyllum</i> , <i>Pfeiff.</i>

TRIBE 5. *Rhipsalideæ*.

GENERA.

<i>Rhipsalis</i> , <i>Gartn.</i>	<i>Lepismium</i> , <i>Pfeiff.</i>	<i>Hariota</i> , <i>DC.</i>
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TRIBE 6. *Opuntia*.

GENUS AND SYNONYME.

<i>Opuntia</i> , <i>T.</i>
<i>Tuna</i> , <i>Dill.</i>

TRIBE 7. *Pereskieæ*.

GENERA AND SYNONYMES.

<i>Pereskia</i> , <i>Pl.</i>
<i>Peirescia</i> , <i>Sp.</i>
<i>Pleiffiera</i> , <i>Salm.</i>

GEOGRAPHICAL DISTRIBUTION.—This family is confined exclusively to the tropics of America, beyond which they extend a short way both to the north and to the south. Although some are found in Africa, Asia, and the south of Europe, there is every reason to believe that they have been introduced. They seem to delight in hot, rugged situations on the sides of mountains, some extending even to the region of perpetual snow.

PROPERTIES AND USES.—The fruit of many is sweet and agreeably acid. The juices which flow from the stems of some is limpid or mucilaginous, with a slight degree of acrimony; in others it is milky, with the caustic properties of the Euphorbias.

A popular favourite in this family is the *Night-blooming Cereus* (*Cereus grandiflorus*), which begins to open its flowers between seven and eight o'clock in the evening during the summer months. About eleven they are in full flower, and by three or four o'clock in the morning they fade and become quite decayed; but while they are in bloom they are unsurpassed for magnificence, and their fragrance perfumes the air to a considerable distance. The calyx of the flower, when open, is nearly a foot in diameter, the inside is of a splendid yellow colour, appearing like the rays of a bright star, and the outside is of a dark brown; the petals, being of a pure white, add to the lustre. Another curious species of this genus is what is popularly termed *The Old Man's Head* (*C. senilis*), from being entirely and densely covered with long, hair-like bristles, of a greyish colour, which hang down like the grey hair of an old man. The fruit of *C. speciosissimus*,

which is grown so much as a greenhouse, and even as a window plant in this country, is, when well ripened, exceedingly delicious. The *Strawberry Pear* (*C. triangularis*) is said to have the finest flavoured fruit of any. The *Prickly Pear*, or *Common Indian Fig*, is *Opuntia vulgaris*, and has been naturalized in the south of Europe, where, in Sicily, it has spread over expanses of volcanic sands and ashes where not a particle of vegetable soil exists. The fruit is about the size of a fig, and red on the inside; it is very much relished by some, but varies in quality according to the climate in which it is produced. The Sicilians grow it extensively, and esteem it one of their most valuable esculents. It is said to stain the urine red of those who eat it. It forms an important article of diet with the inhabitants of that island during three months of the year, though strangers generally consider it insipid. In the countries where it grows, the Prickly Pear is, on account of its rapid growth, much used for the formation of fences round lands and dwellings; and the quickness with which it grows, and its long stout spines, speedily render it such a formidable enclosure, that neither man nor beast can penetrate it. *O. Tuna* also makes strong fences; and when the island of St. Christopher was divided between the English and the French, three rows of the Tuna were planted, by common consent, between the boundaries. Sir J. E. Smith states, that the long and slender stamens of the flower are very irritable, and that, if a quill or feather is thrust through them, in the space of two or three seconds they begin to lie down gently on one side, and in a short time become recumbent at the bottom of the flower. The fruit yields a rich carmine pigment, which is used at Naples as a water-colour. *O. cochinillifera*, or *Nopal*, is the plant on which the Cochineal insect feeds and breeds. It is in Mexico where the production of *Cochineal* is carried on to the greatest extent, but it is also produced in the Canary isles and in Java. The insect is the *Coccus cacti*. A number of the females are preserved during the rainy season; after the rains have ceased, they are distributed over the plants; and, having deposited their eggs, speedily die. The eggs are hatched by the heat of the sun, and give rise to innumerable insects, the males of which are only in the proportion of one to a hundred or two hundred females, and, being provided with wings, they move about and fecundate the latter. After this period, the females, which before moved about, attach themselves to the plant and increase rapidly in size, so that in the end their legs, antennæ, and proboscis, are scarcely discernable, and they appear more like excrescences on the plant than distinct animated beings. They are now gathered by scraping them off by means of a blunt knife, or brushing them off with a quill, a feather, a squirrel's or deer's tail, a few being left to continue the race. They are destroyed by dipping them in hot water, or by the heat of a stove. In the former case they are afterwards dried in the sun. The fruit of *Rhipsalis* is of the size of Currants, pellucid, with an agreeable acidulous taste, and are considered anthelmintic; that of *Pereskia aculeata* is expectorant.

ORDER LXXXVII.—RIBESACEÆ—CURRANTS.

SHRUBS, sometimes armed with spines placed under the leaves. *Leaves* alternate, simple, lobed, furnished with membranous leaflets at their base. *Flowers* hermaphrodite, often unisexual. *Calyx* coloured, with four or five, generally equal, lobes, with a long tube adherent to the ovary. *Corolla*, Fig. A, with small petals, equal in number to the lobes of the calyx, inserted at its orifice and alternate with them. *Stamens* four to five, inserted alternately with the petals. *Ovary* inferior, Fig. B, one-celled, with two opposite seed-bearers attached to its inner surface. *Styles* two, rarely three to four, distinct or more or less united. *Stigmas* simple, obtuse, distinct. *Fruit* a berry, Fig. C, crowned by the limb of the calyx, one-celled, pulpy, many-seeded. *Seeds*, Fig. D, with a pulpy, acidulous integument, and horny albumen. *Embryo* minute, placed at the narrow end of the seed, excentral, with a blunt radicle placed next the hilum, Fig. a.

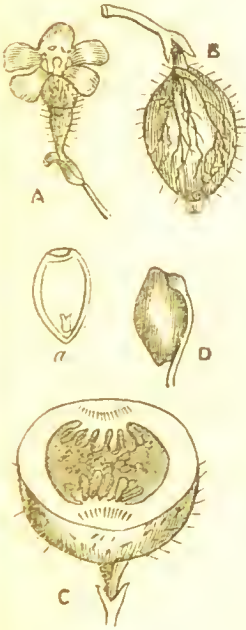


Fig. 112. *Ribes grossularia*.

GENERA AND SYNONYMES.

<i>Ribes</i> , L.	<i>Cerophyllum</i> , Spach.
<i>Grossularia</i> , T.	<i>Rebis</i> , Spach.
<i>Botryocarpum</i> , Rich.	<i>Siphocalyx</i> , DC.
<i>Calobotrya</i> , Spach.	<i>Symphocalyx</i> , Berland.
<i>Corcosma</i> , Spach.	<i>Chrysobotrya</i> , Spach.
<i>Botryocarpum</i> , Spach.	<i>Robsonia</i> , Berland.

GEOGRAPHICAL DISTRIBUTION.—The greatest number of them is found in the northern hemisphere, in temperate and colder regions. A few are found distributed on elevated situations in tropical America, and on the Pacific coast from California to Chili. They are numerous in the mountains of Northern India, in Africa, and generally throughout the Old World, but they have not yet been met with south of the tropics.

PROPERTIES AND USES.—The herbaceous part of the plants of this family is resinous and aromatic; the fruit consists of sweet mucilage, mixed with malic and nitric acid, with which a sort of astringent substance is found.

The *Common Gooseberry* (*Ribes grossularia*) is too well known to require any description. In some parts of England it is called *Feaberry* and *Carberry*, and in Scotland *Grosier*. It may be found wild in many parts of Britain; and it is from this wild plant, subjected to cultivation, that all the garden varieties have originated. The *Red Currant* (*R. rubrum*) is also a native of this country, in the north of England and in Scotland. It is chiefly used in pies, and for making jellies and wine. The jelly, dissolved in water, affords an agreeable, cooling drink, in acute inflammations and bilious fevers; it moderates animal heat, subdues rapid circulation, and is

emollient and cordial. The *White Currant* is merely a variety of the Red, and differs from it only in the colour and less acidity of the fruit. The *Black Currant* (*Ribes nigrum*) may be found frequently in the woods of the north of England and Scotland. The fruit rarely appears at the dessert, but is eaten in puddings and tarts, and is made into jams, jellies, and wine. The Russians put the berries into brandy, and the Irish put them into whiskey, in the same way as the English put cherries. The Russians also ferment the juice with honey, and so form a strong and palatable wine. One or two leaves, or a bud, of the Black Currant put into the tea-pot where black tea is being infused, will communicate to it the flavour of green tea; and those who are fond of that flavour, but to whom green tea is injurious, may thus be enabled most effectually to gratify their taste. The jelly, or jam, is used in cases of sore throats, but chiefly in those of an inflammatory kind. The infusion of the roots is said to be useful in fevers of the eruptive kind; and an infusion of the young leaves tinge common spirits so as to resemble brandy. The fruit of *R. oxycanthoides*, a native of North America, is much like the common gooseberry, and is equally agreeable, either of a red or green colour. *R. lacustre*, also a native of North America, produces fruit in bunches, in size and colour like black currants, which are not unpleasant to the taste. The fruit of *R. fragrans* has a sweet taste; and a very pleasant balsamic resin exudes from the under surface of the leaves, in frequent little yellow drops, which has a strong smell of black currants. The fruit of the beautiful flowering shrub, *R. sanguineum*, is quite destitute of the pulpy substance common to most of the species.



ORDER LXXXVIII.—ESCALLONIACEÆ—ESCALLONIAS.

SHRUBS or trees. *Leaves* alternate, without leaflets at their base, simple,



Fig. 113. *Escallonia macrantha*.

full of resinous glands. *Flowers* hermaphrodite, regular. *Calyx* with five lobes. *Corolla* with five petals, alternate with the lobes of the calyx, from within which they rise, forming, by cohesion, a tube, but finally separating from each other; imbricate in æstivation. *Stamens* arising from the calyx, alternating with the petals; *anthers* bursting lengthwise. *Disk* conical, epigynous, plaited, surrounding the base of the style. *Ovary* inferior, two-celled, with two large, many-seeded, seed-bearers (placentæ) in the axis; *style* simple; *stigma* two-lobed. *Fruit* a capsule, two-celled, splitting by the separation of the cells at their base. *Seeds* numerous, minute, with a transparent membranous integument. *Embryo* minute, in the apex of an oily albumen, having the radicle pointing to the extremity opposite the hilum.

GENERA AND SYNONYMES.

Escallonia, Mut.
Stereoxylon, R. & P.
Mollia, Gmel.
Vigiera, Fl. Fl
Quintinia, Alph. DC.

Forgesia, Comm.
Defforgia, Lam.
Choristylis, Haw.
Itca, L.

Diconangia, Mitch.
Anopterus, Labill.
Polyosma, Blum.
Carpodetus, Forst.

GEOGRAPHICAL DISTRIBUTION.—These are found chiefly in South America, extending as far south as the Straits of Magellan. They are also met with in the Eastern Archipelago, and in the southern parts of Australia and New Zealand. Most of them are ornamental shrubs, and many of them are perfectly hardy in this country; but they are not known to possess any properties. The resinous shoots and leaves are considered tonic by the inhabitants of Chili and Peru.

ORDER LXXXIX.—PHILADELPHACEÆ—MOCK ORANGES.

SHRUBS. *Leaves* opposite, simple, without dots or leaflets at their base.



Fig. 114. *Deutzia gracilis*.

Flowers hermaphrodite, regular. *Calyx* adherent to the ovary, with four to ten lobes. *Corolla* with petals equal in number to the lobes of the calyx, inserted along with the stamens, on the annular epigynous disk. *Stamens* double the number, or a multiple of number of the petals. *Ovary* inferior, adherent, or half adherent, with four to ten cells. *Styles* equal in number to that of the cells of the ovary, distinct, or more or less united together. *Stigmas* linear. *Fruit* a capsule, half adhering to the calyx, one, four, to ten-celled, many-seeded. *Seeds* with a membranous skin. *Albumen* fleshy. *Embryo* inverted almost the length of the albumen, with

oval, obtuse, flattish seed-lobes.

GENERA AND SYNONYMES.

Philadelphus, L.
Syringa, T.

| *Decumaria*, L.
| *Forsythia*, Walt.

| *Deutzia*, Th.
| *Fendlera*, A. Gray.

GEOGRAPHICAL DISTRIBUTION.—They are found in Southern Europe, North America, Japan, and Northern India, but nowhere plentifully.

PROPERTIES AND USES.—In Japan the inner bark of *Deutzia scabra* is employed for poultices, and the leaves, which are there so rough, are universally used by joiners for polishing wood, in the same way as we do Dutch reeds. The flowers of *Philadelphus coronarius*, called *Syringa*, or *Mock Orange*, are very fragrant, and, when growing in shrubberies, perfume the air for a considerable distance, and were formerly considered tonic. They contain a great quantity of essential oil, which is used for adulterating oil of jasmine. The leaves are mixed in salads, and communicate a cucumber flavour.

ORDER XC.—MYRTACEÆ—MYRTLE-BLOOMS.

TREES or shrubs. *Leaves* opposite, rarely alternate or in whorls, simple,



Fig. 115. *Myrtus tomentosa*.

generally furnished with small glands filled with a fragrant essential oil, and without leaflets at their base. *Flowers* hermaphrodite, regular. *Calyx* adherent to the ovary, with four or five lobes, rarely more, sometimes falling off in the form of a cap, as in *Eucalyptus*. *Corolla* with petals equal in number to the lobes of the calyx, inserted at the summit of the tube on a disk which lines its orifice. *Stamens* indefinite in number, rarely equal to that of the petals, distinct or united into many bundles. *Ovary* inferior or half inferior, one or many-celled. *Style* simple. *Stigma* terminal, entire. *Fruit* dry, woody, or fleshy, with one or more single or many-seeded cells, opening or unopening. *Seeds* indefinite, without albumen. *Embryo*

straight or curved, with the seed-lobes and radicle distinguishable or formed into a solid mass.

SUB-ORDER I.—CHAMÆLAUCIÆ.

Stamens often indefinite, and some of them often sterile. Ovary one-celled. Ovules solitary or numerous, erect from the base. Capsule one-seeded, unopening or incompletely two-valved at the apex. Shrubs of Australia, often heath-like, with opposite or rarely alternate dotted leaves. Flowers small, on short pedicles.

GENERA AND SYNONYMES.

<i>Calycotrix</i> , Labill.	<i>Chrysorrhœ</i> ,	<i>Euosanthus</i> , A.	<i>Franciscia</i> , Endl.
<i>Calythrix</i> , Labill.	[Lindl]	[Cunn.]	<i>Triphelia</i> , R. Br.
<i>Lhotskya</i> , Schauer.	<i>Chamælaucium</i> ,	<i>Darwinia</i> , Rudg.	<i>Actinodium</i> ,
<i>Thrytomene</i> , Endl.	[Desf.]	<i>Polyzone</i> , Endl.	[Schauer.
<i>Pileanthus</i> , Labill.	<i>Homoranthus</i> , A.	<i>Genetyllis</i> , DC.	? <i>Bartlingia Brongn</i>
<i>Verticordia</i> , DC.	[Cunn.]	<i>Hedaroma</i> , Lindl.	
<i>Diplachne</i> , R.Br.			

SUB-ORDER II.—LEPTOSPERMEÆ.

Stamens often indefinite, free, or united in several bundles, rarely in one. Ovary two or many-celled. Ovules numerous, or rarely solitary. Capsule many-celled, opening either by the edges or the backs of the carpels, rarely unopening. Shrubs or trees of Australia, with opposite or alternate leaves, entire or rarely serrated, usually dotted.

GENERA AND SYNONYMES.

<i>Astartea</i> , DC.	<i>Conothamnus</i> , Lndl	<i>Metrosideros</i> , R. Br	<i>Pericalymma</i> , En II.
<i>Tristania</i> , R. Br.	<i>Melaleuca</i> , L.	<i>Nani</i> , Ad.	<i>Salisia</i> , Lindl.
<i>Syncarpia</i> , Tenor.	<i>Cajuputi</i> , Ad.	<i>Agalmanthus</i> ,	<i>Leptospermum</i> ,
<i>Kamptzia</i> , Nees.	<i>Eudesmia</i> , R. Br.	[Endl.	[Forst.
<i>Lophostemon</i> , Schtt	<i>Asteromyrtus</i> ,	<i>Glaphyranthus</i> ,	<i>Macklottia</i> , Krth.
<i>Lamarchia</i> , Gaud.	[Schauer.	[Endl.	<i>Fabricia</i> , Gärt.
<i>Calothamnus</i> , Lab.	<i>Symphyomyrtus</i> ,	<i>Kunzea</i> , Reichb.	<i>Bækea</i> , L.
<i>Baudinia</i> , Lesch.	[Schauer.	<i>Eremaea</i> , Lindl.	<i>Imbricaria</i> , Sm.
<i>Billiottia</i> , Colla.	<i>Eucalyptus</i> , Herit.	<i>Billotia</i> , R. Br.	<i>Jungia</i> , Gärt.
<i>Beaufortia</i> , R. Br.	<i>Angophora</i> , Cav.	<i>Agonis</i> , DC.	<i>Mollia</i> , Gmel.
<i>Schizopleura</i> , Lndl.	<i>Callistemon</i> , R. Br.	<i>Balaustion</i> , Hook.	<i>Cedrela</i> , Lour.
<i>Manglesia</i> , Lndl.	<i>Pentagonaster</i> Kl	<i>Hypocalymma</i> Endl	<i>Babingtonia</i> , Lindl.

SUB-ORDER III.—MYRTEÆ.

Stamens indefinite, free. Ovary two or many-celled. Ovules numerous. Berries two or many-celled, very frequently one-seeded by abortion. Tropical or sub-tropical trees or shrubs, with opposite, entire, dotted leaves, generally natives of America.

GENERA AND SYNONYMES.

<i>Sonneratia</i> , L. f.	<i>Calyptanthus</i> , Sw.	<i>Chytraculia</i> , P Br	<i>Eugenia</i> , Michel.
<i>Aubletia</i> , Gärt.	<i>Macropsidium</i> , Bl.	<i>Zuzygium</i> , P. Br	<i>Plinia</i> , L.
<i>Pagapate</i> , Sonner	<i>Myrtus</i> , T.	<i>Chytralia</i> , Ad.	<i>Guapurium</i> , Juss
<i>Blatti</i> , Rheed.	<i>Leucomyrtus</i> , DC	<i>Calyptanthus</i> ,	<i>Oliuthia</i> , Lindl.
<i>Punica</i> , L.	<i>Myrtillus</i> , Endl.	[Juss.	<i>Greggia</i> , Gärt.
<i>Nelitris</i> , Gärt.	<i>Leantia</i> , Sol.	<i>Syzygium</i> , Gärt.	<i>Claviomyrtus</i> , Bl.
<i>Decaspermum</i> ,	<i>Jossinia</i> , Comm.	<i>Opa</i> , Lour.	<i>Gilpkea</i> , Bl.
[Frst.	<i>Eumyrtus</i> , Endl.	<i>Calyptanthus</i> , Bl	<i>Microjambosa</i> , Bl.
<i>Campomanesia</i> R&P	<i>Rhodomyrtus</i> DC	<i>Jambolifera</i> , Auct	<i>Strongylocalyx</i> , Bl.
<i>Psidium</i> , L.	<i>Myrcia</i> , DC.	<i>Caryophyllus</i> , T.	<i>Jambosa</i> , Rumph.
<i>Guaiava</i> , T.	<i>Syllisium</i> , Schau.	<i>Acmena</i> , DC.	<i>Jambos</i> , Ad.
<i>Burchardia</i> , Neck	<i>Marlierea</i> St. Hil.	<i>Cleistocalyx</i> , Bl.	<i>Ceroearpus</i> , Hassk.

SUB-ORDER IV.—BARRINGTONIÆ.

Stamens numerous, often united in one bundle. Ovary inferior, two or many-celled. Ovules definite or numerous. Fruit fleshy, one or many-celled. Tropical trees of Asia and America, with alternate, rarely opposite or whorled leaves, entire, serrated, and without dots.

GENERA AND SYNONYMES.

<i>Barringtonia</i> , Frst.	<i>Stravadia</i> , Pers.	<i>Gustavia</i> , L.	<i>Fœtidia</i> , Comm.
<i>Butanica</i> , Lam.	<i>Botryoropsis</i> , Prl	<i>Pirigara</i> , Aub.	<i>Catinga</i> , Aub.
<i>Commersonia</i> Son	<i>Meteorus</i> , Lour.	<i>Spallanzania</i> , Nek	<i>Coupoui</i> , Aub.
<i>Mitraria</i> , Gmel.	<i>Menichia</i> , Sonn.	<i>Teichmeyeria</i> ,	<i>Mongesia</i> , Fl. Fl.
<i>Huttum</i> , Ad.	<i>Careya</i> , Roxb.	[Scop.	
<i>Stravadium</i> , Juss.	<i>Cambea</i> , Ham.		

Stamens numerous, combined into a hooded petal-like body, placed on one side, and sometimes destitute of anthers. Ovary many-celled; ovules numerous. Fruit dry or fleshy, either opening by a lid, or remaining closed. Trees with alternate leaves, without dots, entire or rarely serrated. Natives of America.

SUB-ORDER V.—LECYTHIDÆ.

GENERA AND SYNONYMES.

Couratari, <i>Aubl.</i>	Cariniana, <i>Casar.</i>	Tonca, <i>Rich.</i>	Pontoppidana,
Lecythis, <i>Schr</i>	Eschweilera, <i>Mart.</i>	Couroupita, <i>Aubl.</i>	[<i>Scop.</i>
Lecythis, <i>Löfl.</i>	Bertholletia, <i>H. & B.</i>		Elscholtzia, <i>Rich.</i>

DOUBTFUL GENERA.

Grias, <i>L.</i>	Petalotoma, <i>DC.</i>	Rhodamnia, <i>Jack.</i>
Crossostylis, <i>Forst.</i>	Diatoma, <i>Lour.</i>	Glaphyria, <i>Jack.</i>

GEOGRAPHICAL DISTRIBUTION.—The individuals of this family are found abundantly between the tropics of America, and in Australia; and more sparingly in Asia and Africa. They are very rare in Southern Europe, and they are also met with in the South Sea Islands.

PROPERTIES AND USES.—Two properties are found to exist in this family; the one, which is very constant, is astringent, and appears to be a mixture of gallic acid and tannin; it is found in the bark, the roots, the leaves, the flowers, and the fruits, before or after their maturity. The other is not so general, and in some species is totally wanting; it is an acrid and very irritant volatile oil, found in small, transparent vesicles, which are in the leaves, the bark, the petals, and the fruit. These two principles are generally united in the same plant, in almost equal proportions; thus, in the Myrtle and the Clove, the leaves and bark of which are filled with these vesicles, full of essential oil, the astringent principle is so abundant that, in some countries, the leaves and bark are employed for tanning leather.

Leptospermæ.—It was long supposed that *Melaleuca leucodendron* yielded *Cajeput Oil*; but a specimen of the tree from which this oil is obtained, being sent from the Moluccas to the botanic garden at Calcutta, it was found to be a distinct species, and therefore called *M. cajeputi*. It is a native of Java, Amboyna, and other neighbouring islands, and it is from distillation of the leaves that the oil is procured. The small proportion yielded by the leaves, and the extensive use made of it in India, make it very costly; it is therefore frequently adulterated, and it is said that oil of rosemary, or of turpentine, impregnated with camphor, and coloured with the resin of milfoil, are used for the purpose. The oil is highly stimulant, producing, when swallowed, a sense of heat, with an increased fullness and frequency of the pulse, and exciting, in some instances, profuse perspiration; externally, it forms a very valuable stimulating liniment and embrocation, useful in chronic rheumatism, paralysis, neuralgic, and similar affections. It is also considered advantageous in cholera, and as a cathartic, cephalic, and emmenagogue. It has the power of dissolving Indian-rubber, and its bark is very serviceable for caulking boats, covering houses, &c. There are other trees of the same genus which yield an oil similar to this.

M. genistifolia is called *White Tea-tree*, in Australia, and its leaves are used as a substitute for tea. *Eucalyptus resinifera* furnishes a gum which is called *Botany Bay Kino*. When the bark is wounded, the juice flows very freely, and hardens in the air. A single tree is capable of furnishing five hundred pounds of Kino in a year. The tree is very lofty, and is called in Australia, *Red Gum Tree*. A substance closely resembling *manna* is procured by exudation from *E. mannifera*. It has been shown to contain a saccharine matter, different from mannite, and though similar to glucose, differing from it, as well as from other varieties of sugar, in properties. Another manna, found in Australia, is produced by exudation from the leaves of *E. dumosa*, when very small, and sometimes appears spread over large districts of country, like a kind of snow, and it is used by the natives as food. A fine, rich, red-coloured gum is obtained from large cavities between the layers of wood in the stem of *E. robusta*; and from *E. Gunnii* a cool, refreshing, and aperient liquid is taken when the bark is wounded, which, when fermented, possesses the properties of beer. The bark of some of the species of *Eucalyptus*, yield a large quantity of *tannin*, which has been extracted and sent over to this country, and has been said by tanners to be twice as powerful in its operation as oak bark. The timber of some of the species has been found highly useful in the colony, where it has been employed in ship-building with great success, it having been found, after a lapse of fifteen years, to be perfectly sound; but, like other ship-woods, it is subject to the attacks of marine animals. Of one species, called *Blue Gum Tree*, keels 100 feet in length, in one piece, have been obtained; and, in the Great Exhibition of 1851, a plank cut from the same description of tree measured 148 feet in length, 22 inches wide, and six inches in thickness.

Metrosideros vera, or *Iron wood*, is a native of Amboyna and Java. The Chinese make rudders and anchors of the wood, and among the Japanese it is very scarce and valuable. The bark is used as a remedy for fluor albus and diarrhœa, being mixed with pinang and a small quantity of cloves and nutmegs. From *M. polymorpha* the South Sea Islanders obtain the wood of which they make their clubs and other weapons. *Leptospermum scoparium*, or *New Zealand Tea-tree*, is a shrub, four to six feet high, growing abundantly in New Zealand and Australia. The leaves of this species were used by Captain Cook's crew as a substitute for tea, and hence the name. They have a very agreeable bitter flavour, with a pleasant smell when fresh, but lose something of both when dry. A strong infusion of them proved emetic to some, in the same manner as green tea. They were also used with spruce-leaves, in equal quantities, to correct their astringency, in brewing beer from them, and they rendered the beer exceedingly palatable.

Myrtæ.—To this sub-order some of the most common articles of domestic use belong. The *Pomegranate* (*Punica granatum*), though it does not produce its fruit in this country, is nevertheless familiar to us in the south, who have the opportunity of seeing in summer its beautiful scarlet blossoms. The fruit is imported from the Mediterranean, on both shores of which the tree grows wild; but it is cultivated in all countries where the climate is sufficiently favourable to bring its fruit to maturity. The fruit of the pomegranate varies much in size and flavour. The pulp is red, succulent,

pleasantly acid, and sweetish, and is used for the same purposes as the orange. The rind is powerfully astringent, and is employed, in the form of decoction, as a gargle in sore throat, in diarrhœa, and as an injection in leucorrhœa; in powder it has been recommended in intermittent fever. In countries where the tree abounds, it is used for tanning leather. The flowers have a bitterish, strongly-astringent taste, and stain the saliva red; they contain tannic and gallic acids, and were used by the ancients in dyeing. The bark of the root, when chewed, colours the saliva yellow, and leaves in the mouth an astringent taste, without any disagreeable bitterness. It contains a peculiar principle, called *Punicin*, which has the appearance of an oleo resin, affects the nostrils somewhat like medicinal veratry, and is of an acrid taste. The bark is used by the native practitioners of India as a vermifuge, and has been proved successful, numerous cures having been performed with it in Europe. *Campomanesia lineatifolia* is a native of Peru, and is cultivated in gardens in that country for the sake of its fruit, which is yellow and sweet-scented, and has much of the taste of the Guava; the inhabitants call it *Palillo*. That of *C. cornifolia* is also eaten. The Guavas are a celebrated fruit, of which there are several kinds. The *Common Guava* is *Psidium pyrifera*, a tree ten to twenty feet high, producing fruit of a pear shape, and grown extensively in the West Indies; and this is also known as the *White Guava*, in contradistinction to the fruit of *P. pomiferum*, or *Red Guava*, which has a red flesh, very acid, and much inferior to the white. The common or white Guava is about as large as a tennis ball, the rind of a russet colour, tinged with red. The pulp is sweet, aromatic, of an agreeable flavour, and interspersed with numerous small white seeds. The fruit is very extensively eaten in the West Indies, both by the natives and by the Europeans, either raw or in the state of jelly; but it possesses great astringency, and is not suited to those of costive habits. The rind, when stewed, is eaten with milk, and is preferred to any other stewed fruit. From the same part marmalade is made; and the whole fruit, prepared with sugar, furnishes the celebrated *Guava jelly*. The buds of Guava, boiled with barley and liquorice, produce an excellent drink for diarrhœas, and even dysentery, when not too inveterate. The wood furnishes excellent fuel, burns with a bright heat, and lasts a long time. The fruit of *P. Cattleianum* is about the size of a small walnut, nearly round, of a deep purple colour. The skin is of the consistence of that of the fig, but is thinner. The interior is a soft, fleshy pulp, purplish-red next the skin, but becoming paler towards the middle, and at the centre it is quite white. It is juicy, and, in consistence, is much like a strawberry, which it resembles in flavour. This is one of the best of the Guavas, and is a native of China, whence it has been introduced to Brazil, and now it is grown extensively in both countries.

The *Common Myrtle* (*Myrtus communis*) is a native of the south of Europe, growing on exposed rocks, but in this country, except in the extreme south, it requires the protection of a house. Its fine odour and easy management, with its fine evergreen, bushy growth, have rendered it a popular window plant. All the parts of this elegant shrub exhale a very agreeable aromatic odour, which is owing to the essential oil contained in the small transparent vesicles or dots found in the substance of the leaves

and other organs. It contains also a slightly astringent principle, particularly in the leaves and the bark, and it was formerly administered as tonic and stimulant, but now the plant is regarded more as a pretty and ornamental shrub. In Tuscany they make a sort of myrtle wine, which is called *Myrtidandum*. There are a great many varieties of the common myrtle based on the changeable character of the leaves, some being broad-leaved, narrow-leaved, myrtle-leaved, &c.; and there is one called *leucocarpa*, a native of Greece, producing a large fruit, which is eatable, and has a grateful taste and smell. The fruit of *M. salutaris*, a native of the banks of the Orinoco, is as large as a sloe; and the decoction of the root of this species is considered good against hemorrhages. *Myrcia acris*, a native of the West Indies, is called in Jamaica *Wild Cinnamon* or *Wild Clove*. It is a handsome tree, twenty to thirty feet high, and yields a timber which is very hard, red, and weighty, capable of being polished and used for mill cogs. The leaves have a very sweet aromatic smell resembling that of cinnamon; and, on account of their agreeable astringency, are often used in sauces. The berries are round and as large as peas, and have an aromatic smell and taste, which renders them agreeable for culinary purposes. The leaves, berries, and flower-buds of *M. pimentoides* have a hot taste and fragrant smell, and are also used for culinary purposes.

The *Clove* spice is the produce of *Caryophyllus aromaticus*, and is the dried flower-buds of the tree. The Clove is a tree twenty to forty feet high, a native of the Moluccas, but now cultivated all over the East Indies, where situations favourable to its growth can be obtained, and also in some of the West India islands. The cloves of commerce are the unexpanded flower-buds, the corolla forming a ball on the top between the teeth of the calyx. They are first gathered when the trees are about six years old, and are either collected by hand or beaten with reeds so as to fall upon cloths which are placed under the trees to receive them, and dried either by fire-heat or in the sun. The fruit, which is a dry berry, also possesses a very aromatic taste and odour. The use of cloves in domestic economy is well known. Water extracts the odour of cloves, with comparatively little of their taste. All their sensible properties are imparted to alcohol; and the tincture, when evaporated, leaves an excessively fiery extract, which becomes insipid when deprived of the oil by distillation with water, while the oil which comes over is mild. *Oil of Cloves* is obtained by distilling cloves with water, to which it is customary to add common salt, in order to raise the temperature of ebullition; and the water should be repeatedly distilled from the same cloves, in order completely to exhaust them. Cloves are stimulant aromatics.

The fruit of *Eugenia inocarpa*, a native of Brazil, is as large as a plum, with sweet acid flesh. *E. Ugni* has of late been highly extolled as a fruit-bearing shrub adapted to the milder situations of this country. It is a native of Chili, and has been long known under the name of *Myrtus Ugni*. In Chili, the natives call it *Ugni*, and the Spaniards *Murtilla*. The juice is expressed from the fruit and mixed with water, furnishing a very refreshing drink, with somewhat of the odour of rosemary. The fruit is the size of a large black currant somewhat flattened, and of a brownish-red colour. The pulp is light-coloured, soft, and juicy, with singular mixture of a sweet and spicy flavour, which is very agreeable. It is cultivated in gardens and used

in the dessert by the inhabitants of Valparaiso. The fruit of *E. pseudo-psidium*, which grows on the mountains of Martinico, is held in great esteem in the West Indies, where it is called *Gouyavier batard*. A decoction of the leaves of *E. cheken* is said to cure diseases of the eyes. The bark is so astringent as to render a decoction of it of great use in cases of dysentery. The seeds of *E. tabasco* are used as a condiment. *Jamaica Pepper*, or *All-spice*, is the fruit of *E. pimento*, a native of the Carribbee islands, and now cultivated also in the East Indies. It is a handsome tree about thirty feet high, with a straight trunk much branched above, with dense evergreen foliage. Soon after the trees have blossomed, the berries become fit for gathering, without being suffered to ripen; as, when ripe, they are moist and glutinous, and therefore difficult to cure, and, when dried, become black and tasteless. The berries are dried by spreading them on a terrace exposed to the sun for about seven days, during which time they gradually lose their green colour and become of a reddish-brown. They have a fragrant odour, which is supposed to resemble that of a mixture of cinnamon, cloves, and nutmeg; and hence the name of allspice by which they are known. Their taste is warm, aromatic, pungent, and slightly astringent. They impart their flavour to water, and all their virtues to alcohol, and yield a volatile oil by distillation called *Oil of Pimento*. Beside the volatile oil, they contain a green fixed oil, a concrete oleaginous substance, tannin, gum, resin, uncrystallizable sugar, colouring matter, malic and gallic acids, saline matters, moisture, and lignin. The green oil has the burning aromatic taste of pimento, and is supposed to be the acrid principle. Besides being used in domestic economy as a spice, it possesses medical properties, which are warm, aromatic, stimulant, and is particularly useful in cases attended with much flatulence. *Jambosa vulgaris*, or *Rose-apple*, is a native of the East Indies, and is now cultivated in all tropical countries for the sake of its fruit, which is about the size of a medlar, and pear-shaped, with the flavour of the apricot. The *Malay Apple* (*J. malaccensis*) is an inch and a half in diameter, fleshy, and sweet-scented like the rose, agreeable to the taste, smell, and sight, and esteemed wholesome. It is common in most of the islands of the South Sea.

Barringtoniæ.—The root of *Barringtonia racemosa*, a native of the Moluccas, is reckoned a febrifuge; and the seeds of *B. speciosa* mixed with bait stupefy fish; when reduced to charcoal, they are useful as a remedy against cholic and diarrhœa. The young leaves of both species are eaten in salads. The fruit of *Careya arborea* is four inches in diameter, pear-shaped, and eatable. The leaves of *Gustavia augusta* serve for cataplasms in South America. The flowers are fragrant, and the wood, which is extremely fetid, is used in Surinam for hooks. Humboldt says, by eating the small fruit of *G. speciosa*, the body becomes yellow, and after it remains twenty-four or forty-eight hours, nothing can erase the colour.

Lecythidæ.—The great peculiarity in this sub-order is, in having the fruit in the form of a wooden pot, or urn with a lid, which the monkeys are so knowing as to remove, and extract the nuts that are inside, and hence it has been called *Monkey-pot*. The trees are also called *Cannon-ball Tree*. *Lecythis allaria* is a tree sixty feet high, and produces the nuts called *Sapucaia Nut*, which may of late years be frequently met with in the fruiterers' shops of this country; in Brazil they are called *Jaca-pucaya*.

The fruit is very hard, as large as a child's head, and furnished with a lid, which falls off when it is ripe, and the dry pulp and seeds also fall out, but the pot, or capsule, frequently hangs on for two years afterwards. Each of these capsules contains a number of nuts, which are about an inch and a half or two inches long, slightly curved and grooved, being in shape somewhat like a small girkin cucumber, but of a light brown colour. The shell is soft, and the kernel is very mild, mellow, with a sort of cream or custard flavour, and may be eaten either raw or roasted. The bark of the tree is easily separable into distinct layers by breaking it, and then the layers divide so neatly from each other that, when separated, they have the appearance of satin paper. The *Brazil Nut* of the shops is *Bertholletia excelsa*, a tree said to have been originally from Pará, in Brazil, and hence the seeds are also called *Pará nut*, but now cultivated throughout Brazil and Guiana. The fruit is a thick, hard, woody, oval capsule, like a pot with a lid to it, four inches in diameter, and five, six, or more inches in height, and contains many triangular nuts, laid over each other in a regular manner, which are well known as being sweet and pleasant to the taste. An oil is extracted from them which is sweet and agreeable, and is used by watch-makers and oil painters. The Portuguese turn boxes and toys out of the capsules, and they are also used for drinking-pots, cups, and culinary utensils. The fruit of *Couroupita guianensis* is as large as a head, and called *Cannon-ball*, the pulp of which is white, acid, and not disagreeable.



ORDER XCI.—HALORAGIACEÆ.

GENERALLY aquatic plants, herbaceous or shrubby. *Leaves* alternate, opposite, or in whorls. *Flowers*, Fig. A, sometimes incomplete, hermaphrodite, or unisexual by abortion. *Calyx* with four lobes, or almost wanting. The *corolla*, which is sometimes wanting, has three or four minute petals inserted in the summit of the calyx, and alternate with its lobes. *Stamens* inserted with the petals, equal in number to them, or occasionally fewer. *Ovary*, Fig. B, inferior, with one to four cells, each containing a single reversed ovule; *styles* none; *stigmas* equal in number to the cells of the ovary, covered with watery protuberances, sessile. *Fruit* dry, unopening, covered with the lobes of the calyx, with one or more cells. *Seeds* solitary in the cells, pendulous; *albumen* fleshy or wanting. *Embryo* straight in the axis, with a superior, round, elongated radicle, and two minute, short, seed-lobes.



Fig. 116. *Hippuris vulgaris*.

GENERA AND SYNONYMES.

<i>Hippuris</i> , L.	<i>Ptilophyllum</i> , Nutt.
<i>Limnopenace</i> , Vaill.	<i>Purshia</i> , Raf.
<i>Pinastella</i> , Dill.	<i>Hyias</i> , Bigel.
<i>Myriophyllum</i> , Vaill.	<i>Serpicula</i> , L.
<i>Spondylophyllum</i> , T. & G.	<i>Laurembergia</i> , Berg.
<i>Pentapterophyllum</i> Dill.	<i>Proserpinaca</i> , L.
<i>Pentapteris</i> , Hall.	<i>Trixis</i> , Mitch.
<i>Spondylastrum</i> , T. & G.	<i>Meioneetis</i> , R. Br.

<i>Haloragis</i> , Forst.	<i>Goniocarpus</i> , Kon	<i>Milligania</i> , Hook. f.	<i>Perpensum</i> Burm
<i>Cercodia</i> , Murr.	<i>Londonia</i> , Lindl.	<i>Gunnera</i> , L.	Panke, Fenill.
<i>Cercodea</i> , Lam.	<i>Glischrocaryon</i> ,	<i>Misandra</i> , Comm.	<i>Trapa</i> , L.
<i>Gonocarpus</i> , Th.	[Endl.]	<i>Disomena</i> , Banks.	<i>Tribuloides</i> , T.
<i>Gonatocarpus</i> , W.			

GEOGRAPHICAL DISTRIBUTION.—They are rare between the tropics, and are found most frequently in the temperate and colder regions both of the northern and southern hemisphere, chiefly in moist and marshy situations.

PROPERTIES AND USES.—As its name implies, *Haloragis citriodora* has a strong lemon scent. The mucous juice of *Gunnera scabra* turns black on exposure to the air; the root is considered astringent, and good against diarrhoea and hemorrhages, and the fleshy footstalks of the leaves are eaten. The fruit of *G. macrophylla* is considered stimulant. The large seeds of *Trapa natans* are farinaceous and nourishing. The kernel tastes like a chestnut, and they are sold in the markets of Venice under the name of *Jesuit's Nuts*. The ancient Thracians used them as an article of food, and the present inhabitants of Cashmere make the same use of those of *T. bispinosa*, which is called *Singhara Nut*. The Chinese eat the seeds of *T. bicornis*.

ORDER XCII.—CENOTHERACEÆ—EVENING PRIMROSE FAMILY.

HERBS or shrubs. *Leaves* opposite or alternate, generally without leaflets at their base. *Flowers* hermaphrodite, regular, rarely irregular. *Calyx* green or coloured, sometimes prolonged into a long tube, with four, rarely two to three divisions. *Corolla* with the petals inserted at the summit of the calyx, and equal in number to that of its divisions. *Stamens* equal in number to that of the petals, or double their number, and inserted with them. *Ovary*, Fig. A, inferior, generally with four cells, rarely with two; *style* filiform; *stigmas* two to four, linear, covered with small pimples, rarely united. *Fruit* dry, capsular, and opening by the back of the carpels; sometimes a berry, as in *Fuchsia*, Fig. B, many-seeded. *Seed* without albumen, with a straight embryo, having a long, round radicle.



Fig. 117. *Fuchsia magellanica*.

TRIBE 1. *Jussievezæ*.—Tube of the calyx not extending beyond the ovary. Stamens equal or double the number of the petals. Fruit a capsule, opening by the inner suture of the carpels.

GENERA AND SYNONYMES.

<i>Prieuria</i> , DC.	<i>Isnardia</i> , L.
<i>Jussiaea</i> , L.	<i>Ludwigia</i> , L.
<i>Cubospermum</i> , Lour.	<i>Dantia</i> , Thours.
<i>Corynostigma</i> ,	<i>Ludwigia</i> , DC.
<i>Ludwigia</i> , Roxb.	

TRIBE 2. *Epilobezæ*.—Tube of the calyx more or less drawn out beyond the ovary. Stamens double the the number of the petals. Fruit a capsule, opening by the backs of the carpels, many-seeded. Seed naked, fringed or bearded.

GENERA AND SYNONYMES.

<i>Gayophytum</i> , Ad.	<i>Onagra</i> , T.	<i>Kneiffia</i> , Spach.	<i>Eulobus</i> , Nutt.
[Juss.]	<i>Anogra</i> , Spach.	<i>Blennoderma</i> ,	<i>Clarkia</i> , Pursh.
<i>Sphærostigma</i> , Scr.	<i>Baumannia</i> , Spch.	[Spch.]	<i>Phæostoma</i> Spach
<i>Onosuris</i> , Raf.	<i>Allochroa</i> , F. & M.	<i>Xylopleurum</i> ,	<i>Eucharidium</i> , F & M
<i>Chamissonia</i> Link	<i>Megapterium</i> ,	[Spch.]	<i>Epilobium</i> , L.
<i>Heterostemum</i> ,	[Spch.]	<i>Goodetia</i> , Spach.	<i>Chamaenerion</i> ,
[Nutt.]	<i>Pleurostemon</i> ,	<i>Cratericarpium</i> ,	[Tau.]
<i>Agassizia</i> , Spach.	[Raf.]	[Spch.]	<i>Lysimaehion</i> ,
<i>Holostigma</i> Spach	<i>Pleurandra</i> , Raf.	<i>Boisduvalia</i> , Spch.	[Taus.]
<i>Meriolix</i> , Raf.	<i>Pachylophis</i> Spch	<i>Dietyopetalum</i> ,	<i>Crossostigma</i> ,
<i>Calylophis</i> , Spach	<i>Lavania</i> , Spach.	[F. & M.]	[Spch.]
<i>Cenothera</i> , L.	<i>Hartmannia</i> Spch	<i>Pachydium</i> , F & M	<i>Zauchneria</i> , Prt.

TRIBE 3. *Montineæ*.—Tube of the calyx either of equal length with the ovary, or drawn out beyond it. Stamens double the number of the petals. Fruit a capsule, opening by the backs of the cells, many-seeded. Seeds winged.

GENERA.

Montima, *L.*

| *Hauya*, *Moc. & Sess.*

TRIBE 4. *Fuchsieæ*.—Tube of the calyx drawn out beyond the ovary. Stamens double the number of the petals. Fruit a berry, many-seeded.

GENERA AND SYNONYMES.

<i>Fuchsia</i> , <i>Pl.</i>	„ <i>Lyciopsis</i> , <i>Spach.</i>	„ <i>Ellobum</i> , <i>Lilja.</i>	<i>Quelusia</i> , <i>Vand.</i>
<i>Dorvalia</i> , <i>Comm.</i>	<i>Kierschlegeria</i> ,	<i>Thilco</i> , <i>Fcuill.</i>	<i>Schufia</i> , <i>Spach.</i>
<i>Encliandra</i> , <i>Zucc.</i>	[<i>Spach.</i>	<i>Nahusia</i> , <i>Schnee.</i>	<i>Skinnera</i> , <i>Forst.</i>
<i>Brebissonia</i> , <i>Spch</i>	<i>Spachia</i> , <i>Lilja.</i>		

TRIBE 5. *Lopezieæ*.—Tube of the calyx drawn out beyond the ovary. Petals four, or sometimes wanting. Stamens two or one. Fruit a capsule, many-seeded.

GENERA AND SYNONYMES.

<i>Semciandra</i> , <i>H. & A.</i>	<i>Diplandra</i> , <i>H. & A.</i>	<i>Pisaura</i> , <i>Bonat.</i>
<i>Riesenbachia</i> , <i>Presl.</i>	<i>Lopezia</i> , <i>Cav.</i>	<i>Circæa</i> , <i>T.</i>

TRIBE 6. *Gaureæ*.—Tube of the calyx drawn out beyond the ovary. Stamens double the number of the petals. Fruit like a nut, one to four-seeded.

GENERA AND SYNONYMES.

<i>Gaura</i> , <i>L.</i>	<i>Schizocarya</i> , <i>Spach.</i>	<i>Gongylocarpus</i> , <i>Sch. & Depp.</i>
<i>Gauridium</i> , <i>Spach.</i>	<i>Stenosiphon</i> , <i>Spach.</i>	

GEOGRAPHICAL DISTRIBUTION.—These are distributed almost throughout the whole surface of the globe, in the temperate regions of the northern hemisphere, and especially abundant in the New World, where, also, they border closely on the southern tropics. The *Jussieæ* are tropical.

PROPERTIES AND USES.—Some of the *Jussieæ* are considered moderately astringent, and are used in Asia and tropical America for fomentations and cataplasms. *J. carparosa* and *J. scabra* are used in Brazil for dyeing black; and *J. pilosa* furnishes a yellow dye. *Isnardia diffusa*, a native of India, is considered anthelmintic and diuretic; and *I. alternifolia*, found in the marshes of Carolina, where it is called *Bowman's Root*, possesses emetic properties in its roots.

Epilobææ.—The *Common Evening Primrose* was not known in this country before 1614, when it appeared on the coast of Lancashire, a few miles above Liverpool, the seed having been drifted on the ocean from the east coast of America, of which it is a native, and now it may be found naturalized over almost the whole of Europe. The roots of this species, and that of several others, are eaten in salads. It is sometimes used medicinally; a strong decoction of the small branches, with the leaves and

the cortical part of the stem and larger branches, having been found very beneficial in eruptive complaints, and especially tetter: *Epilobium angustifolium*, called in gardens *French Willow*, and *Willow Herb*, is very ornamental, but when it once gets into the soil, it is very difficult to eradicate, it becoming, in fact, a weed as troublesome as couch or bindweed. The young shoots are said to be eatable, although a decoction of the plant stupefies. The pith, when dried, is boiled, and becoming sweet is, by a proper process, made into ale, and this into vinegar by the Kantschatdales. It is also added to the cow parsnip, to enrich the spirit that is prepared from that plant.

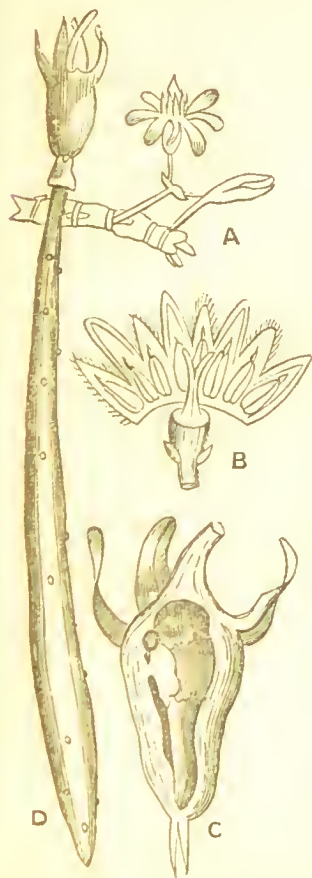
Fuchsiae.—The leaves and branches of *Fuchsia macrostemma*, and *F. coccinea* are used in decoction, by the Chilians, as a refrigerant, and the wood is used for dyeing. *F. racemosa* is used in intermittent fevers and blennorrhœa. The berries of *F. denticulata*, and other American species, are eaten, when preserved with sugar. *Skinnera* (*Fuchsia*) *excorticata*, a native of New Zealand, yields fruit which is pleasant, very sweet, and eaten with great avidity by birds.

Montinia acris, a native of the Cape, has, in all its parts, and particularly in its fruit, an acrid flavour, greater even than that of pepper. *Circea lutetiana*, or *Enchanter's Nightshade*, is considered slightly astringent, and is only applied externally.



ORDER XCIII.—RHIZOPHORACEÆ—MANGROVES

TROPICAL trees or shrubs. *Leaves* opposite, simple, entire or toothed. *Flowers*, Fig. A, hermaphrodite, regular. *Calyx* with four to twelve lobes. *Corolla*, Fig. B, with petals equal in number to the lobes of the calyx, and alternating with them. *Stamens* inserted with the petals, equal to them in number, or double or triple that number; filaments free, awl-shaped, erect. *Ovary* inferior, two-celled; cells two, or many-ovuled; *ovule* pendulous. *Fruit*, Fig. C, unopening, one-celled, one-seeded, crowned by the calyx. *Seed* pendulous, without albumen. *Embryo*, Fig. c, with a very long radicle, and two flat seed-lobes.



GENERA AND SYNONYMES.

Rhizophora, L.
Mangle, Endl.
Aërope, Endl.
Ceriops, Arn.
Kandelia, W. & A.
Bruguiera, Lam.
Paletuveria, Thou.
Carallia, Roxb.

Baraldeia, Thou.
Baraultia, Steud.
Diatoma, Lour.
Petaloma, DC.
Catalium, Nam.
Demidofia, Denn.
Kanilia, Bl.

GEOGRAPHICAL DISTRIBUTION.—This family is found in salt marshes along the shores of tropical regions.

PROPERTIES AND USES.—The bark of all the species of this family is astringent, and is used for tanning and dyeing, as well as that of some of them for medicine. One of the most curious plants is the type of this family—*Rhizophora Mangle*, or *Common Mangrove Fig*. It is found on low marshy places on the sea-shore of all tropical countries.

The fruit germinates in a cup, Fig. D, while hanging on the tree, and grows from the

top downwards until it acquires a due degree of weight and perfection, then it falls off, and as the root is always the thickest, and hangs lowest, it drops in that direction, takes root in the mud, and grows; it also throws down long shoots from its branches, which take root, and thus dense thickets are formed, which, excluding the sun's rays, engender miasmata, and render the locality unhealthy. On its stem, and under the roots, is found the crab (*Cancer uca*), which is considered dangerous to eat, because it feeds on poisonous herbs; and some species of oysters also adhere to them, giving rise to the fabulous account of this mollusk being found on trees as a fruit. The wood is tough and durable.

Fig. 118. *Rhizophora mangle*.

ORDER XCIV.—MELASTOMACEÆ—MELASTOMS.

TREES, shrubs, and herbs. *Leaves* opposite or in whorls, simple, with



Fig. 119. *Osbeckia stellata*.

from three to nine principal nerves, dividing at the base. *Flowers* hermaphrodite, regular. *Calyx* generally with five lobes, sometimes less, or accompanied with small intermediate teeth. *Corolla* with petals equal in number to the lobes of the calyx, and inserted in their base. *Stamens* inserted with the petals, and arranged in two series, ordinarily of unequal length and different form in each of the series. *Anthers* long, tapering to the summit, two-celled, usually bursting by two pores at the apex, and sometimes bursting longitudinally; before flowering, they are contained within the cases between the ovary and the sides of the calyx. *Ovary* sometimes free, sometimes adherent, many-celled. *Style* and *Stigma* simple. *Fruit* a berry or a capsule, with several cells. *Seeds* without albumen. *Embryo* straight or curved, with equal or unequal seed-lobes.

SUB-ORDER I.—MELASTOMEÆ.

Anthers opening by one or by two pores.

TRIBE 1. *Lavoisiereæ*.—Ovary free, neither bristly nor scaly at the apex. Fruit a dry capsule. Seeds ovate or angular, with a lateral linear hilum.

GENERA AND SYNONYMES.

<i>Meriania</i> , Swartz.	<i>Brachycentrum</i> ,	<i>Calyptrella</i> , Naud.	<i>Plagiophyllum</i> ,
<i>Wrightia</i> , Sol.	[<i>Meisn.</i>	<i>Cynopodium</i> Naud	[<i>Schlecht.</i>
<i>Schwerinia</i> , Krst.	<i>Notocentrum</i> , Naud	<i>Graffenrieda</i> , DC.	<i>Brachycentrum</i> ,
<i>Axinæa</i> , R. & P.	<i>Calyptraria</i> , Naud.	<i>Huberia</i> , DC.	[<i>Meisn.</i>
<i>Chastenea</i> , DC.	<i>Davya</i> , DC.	<i>Urodesmium</i> , Naud	<i>Pyramia</i> , Cham.
<i>Pachymeria</i> Benth	<i>Adelobotrys</i> , DC.	<i>Behuria</i> , Cham.	<i>Centronia</i> , Don.
<i>Lavoisiera</i> , DC.	<i>Adelbertia</i> , <i>Meisn</i>	<i>Centradenia</i> , G Don	<i>Truncaria</i> , DC.
	<i>Platycentrum</i> Naud		<i>Leiotestia</i> , Benth.

Sarmentaria, <i>Naud</i>	Chætostoma, <i>DC.</i>	Triblemma, <i>Mart</i>	Trigonocapsa, <i>Bl.</i>
Rhynchanthera <i>DC</i>	Meisneria, <i>DC.</i>	Lithobium, <i>Bong.</i>	Triolena, <i>Naud.</i>
Proboscidea, <i>Rich</i>	Siphanthera, <i>Pohl.</i>	Sonerila, <i>Roxb.</i>	Erioenema, <i>Naud.</i>
Bucquetia, <i>DC.</i>	Salpinga, <i>Mart.</i>	Cassebeeria <i>Denn</i>	Sphærogynæ, <i>Naud.</i>
Cambessedesia, <i>DC.</i>	Aulacidium, <i>Rich</i>	Eusonerila, <i>Bl.</i>	Gravesia, <i>Naud.</i>
Stenodon, <i>Naud</i>	Bertolonia, <i>Radd.</i>		

TRIBE 2. *Rhexiææ*.—Anthers opening by one pore at the apex. Ovary free, neither scaly nor bristly at the apex. Fruit a dry capsule. Seeds cochleate, with an orbicular basilar hilum.

GENERA AND SYNONYMES.

Tulasnea, <i>Naud.</i>	Fritzhia, <i>Cham.</i>	Ernestia, <i>DC.</i>	Pterogastra, <i>Naud.</i>
Onoctonia, <i>Naud.</i>	Microlicia, <i>Don.</i>	Rhexia, <i>R. Br.</i>	Heterocentron <i>H&A</i>
Dicrananthera <i>Pohl</i>	Jaravea, <i>Scop. p.</i>	Eurhexia, <i>T. & G.</i>	Oxyspora, <i>DC.</i>
Poteranthera, <i>Bong</i>	Noterophila, <i>Mart.</i>	Calorhexia, <i>T & G</i>	Marcetia, <i>DC.</i>
Spennera, <i>Mart.</i>	Miocarpus, <i>Naud.</i>	Rhexantha, <i>T & G</i>	Trembleya, <i>DC.</i>
Jaravea, <i>Scop p.</i>	Jaravea, <i>Scop. p.</i>	Dinophora, <i>Benth.</i>	Jacobia, <i>DC.</i>
Comolia, <i>DC.</i>	Uranthera, <i>Naud.</i>	Heteronoma, <i>DC.</i>	Abrahamia, <i>DC.</i>
Tricentrum, <i>DC.</i>	Nepsera, <i>Naud.</i>	Pachyloma, <i>DC.</i>	Eriolema, <i>DC.</i>
Appendicularia, <i>DC</i>	Desmoscelis, <i>Naud.</i>	Dichæandra, <i>Naud</i>	

TRIBE 3. *Osbeckiææ*.—Anthers opening by one pore at the apex. Ovary sometimes free, sometimes adhering to the calyx, crowned by bristles or scales at the apex. Seeds cochleate, with an orbicular basilar hilum.

GENERA AND SYNONYMES.

Lasiandra, <i>DC.</i>	Ladanopsis, <i>DC.</i>	Argyrella, <i>Naud.</i>	Heterotis, <i>Benth.</i>
Macairea, <i>DC.</i>	Trifurcarium, <i>DC</i>	Purpurella, <i>Naud.</i>	Osbeckiastrum,
Hephestionia, <i>Naud</i>	Monochaetum <i>DC</i>	Ancistrodesmus, <i>Nd</i>	[<i>Naud.</i>
Oreocosmus, <i>Naud.</i>	Heeria, <i>Schlecht.</i>	Mieranthelia, <i>Naud</i>	Nerophila, <i>Naud.</i>
Chætogastra, <i>DC.</i>	Suitramia, <i>Cham.</i>	Otanthera, <i>Bl.</i>	Tetrameris, <i>Naud.</i>
Monocentra, <i>DC.</i>	Tibouchina, <i>Aub</i>	Lachnopusium <i>Bl</i>	Aciotis, <i>Don.</i>
Diotanthera, <i>DC.</i>	Savastania, <i>Neck.</i>	Arthrostemma, <i>DC.</i>	Castratella, <i>Naud.</i>
Bractearia, <i>DC.</i>	Diplostegium, <i>Don</i>	Brachyandra,	Chætrolepis, <i>DC.</i>
Arthrostemma, <i>Pav</i>	Tristemma, <i>Juss.</i>	[<i>Naud.</i>	Microlepis, <i>DC.</i>
Melanium, <i>Rich.</i>	Pleroma, <i>Don.</i>	Pterolepis, <i>Miq.</i>	Monochaetum, <i>Naud</i>
Chætopetalum,	Melastoma, <i>Burm.</i>	Osbeckia.	Grischowia, <i>Krst.</i>
[<i>DC.</i>	Acinodendron, <i>L.</i>	Asterostoma, <i>Bl.</i>	Dionyehia, <i>Naud.</i>
Brachyotum, <i>DC.</i>	Melastomastrum <i>Nd</i>	Dissotis, <i>Benth.</i>	

TRIBE 4. *Miconiææ*.—Anthers opening by one or two pores at the apex. Ovary adhering to the calyx. Fruit a berry. Seeds not cochleate.

GENERA AND SYNONYMES.

Rousseauxia, <i>DC.</i>	Calophysa, <i>Naud.</i>	Pogonanthera, <i>Bl.</i>	Calyceogonium, <i>DC.</i>
Dichætanthera <i>Endl</i>	Myrmidone, <i>Mart.</i>	Allomorpha, <i>Bl.</i>	Calycopteris <i>Rich</i>
Amphiblemma, <i>Nd.</i>	Tococa, <i>Aubl.</i>	Allozygia, <i>Naud.</i>	Ossæa, <i>DC.</i>
Leandra, <i>Radd.</i>	Maicta, <i>Aubl</i>	Homocentria, <i>Naud</i>	Sagræa, <i>DC.</i>
Clidemia, <i>Don.</i>	Medinilla, <i>Gaud.</i>	Ochthocharis, <i>Bl.</i>	Tetrazygia, <i>Rich.</i>
Tchudya, <i>DC.</i>	Diplogenea, <i>Lindl.</i>	Anerincleistus,	Tetrastemon, <i>DC</i>
Oxymcris, <i>DC.</i>	Daetyliota, <i>Bl.</i>	[<i>Krthls.</i>	Octostemon, <i>DC.</i>
Myriaspora, <i>DC.</i>	Hypenanthc, <i>Bl.</i>	Macrolenes, <i>Naud.</i>	Octomeris, <i>Naud.</i>
Hamastris, <i>Mart.</i>	Triplectrum, <i>Don.</i>	Carionia, <i>Naud.</i>	Diclemia, <i>Naud.</i>
Chalybea, <i>Naud.</i>	Erpetina, <i>Naud.</i>	Sarcopyramis, <i>Wall.</i>	Capitellaria, <i>Naud.</i>
Microphysa, <i>Naud.</i>	Pachycentrea, <i>Bl.</i>	Veprecella, <i>Naud.</i>	Heterotrichum, <i>DC</i>

Clidemiastrum, <i>Nd.</i>	Henriettea, <i>DC.</i>	„ Chitonia, <i>Don.</i>	Pogonorynchus,
Dissochaeta, <i>Bl.</i>	Phyllopus, <i>DC.</i>	Leonicea, <i>Scop.</i>	[<i>Crug.</i>
Dalenia, <i>Krthls.</i>	Henriettella, <i>Nd.</i>	Chænopleura, <i>DC.</i>	Staphidium, <i>Naud.</i>
Omphalopus, <i>Naud.</i>	Loreya, <i>DC.</i>	Hypoxanthus,	Stephanotrichum
Marumia, <i>Bl.</i>	Truncaria, <i>DC.</i>	[<i>Rich.</i>	[<i>Naud.</i>
Drissenia, <i>Krthls.</i>	Marumia, <i>Bl.</i>	Jucunda, <i>Cham.</i>	Cyanophyllum, <i>Nd.</i>
Bredia, <i>Bl.</i>	Phyllagathis, <i>Bl.</i>	Graffenrieda, <i>Mrt</i>	Staphidiastrum, <i>Nd</i>
Aplectrum, <i>Bl.</i>	Miconia, <i>R. & P.</i>	Decaraphe, <i>Steud</i>	Blakea, <i>L.</i>
Conostegia, <i>Don.</i>	Cremanium, <i>Don.</i>	Augustinea, <i>St Hil</i>	Topabea, <i>Aub.</i>
Calycotomus, <i>Rich</i>	Cyathanthera,	Fothergilla, <i>Aub.</i>	Valdesia, <i>R. & P.</i>
Brugniera, <i>Rich.</i>	[<i>Pohl.</i>	Hartigia, <i>Miq.</i>	Drepanandrum, <i>Nk.</i>
Bellucia, <i>Neck.</i>	Diplochita, <i>DC.</i>	Glossocentrum,	Pyxidanthus, <i>Naud</i>
Apatitia, <i>Desv.</i>	Diplochiton, <i>Sp.</i>	[<i>Crug.</i>	Croechiton, <i>Naud.</i>

SUB-ORDER II.—CHARIANTHÆ.

Anthers two-celled, opening by two longitudinal fissures. Fruit fleshy. Seeds wedge-shaped and angular.

GENERA AND SYNONYMES.

Charianthus, <i>Don.</i>	Pternandra, <i>Jacq.</i>	Lijndenia, <i>Zoll.</i>	Cremastostemon,
Chuenanthera,	Macroplacis, <i>Bl.</i>	Leneymmia, <i>Prl.</i>	[<i>Hort.</i>
[<i>Rich.</i>	Astronia, <i>Bl.</i>	Guildingia, <i>Hook.</i>	Myrrhinium, <i>Schtt.</i>
Tetrazygos, <i>Rich.</i>	Spathandra, <i>G. & P.</i>	Olisbea, <i>DC.</i>	Feliceiana, <i>Camb.</i>
Kibessia, <i>DC.</i>	Memecylon, <i>L.</i>	Mouriria, <i>Juss.</i>	Tetrastemon,
Rectomitra, <i>Bl.</i>	Valikaha, <i>Ad.</i>	Petaloma, <i>Sw.</i>	[<i>Hook.</i>
Ewykia, <i>Bl.</i>	Scutula, <i>Low.</i>	Olinia, <i>Th.</i>	Fenzlia, <i>Endl.</i>

GEOGRAPHICAL DISTRIBUTION.—They grow very plentifully in tropical America; a few are found north of the tropics as far as the 40° of latitude, but south of the tropics they are not met with; very few inhabit tropical Africa; a few are indigenous to Asia, particularly in the islands, but not any have been found on the mainland north of the tropics.

PROPERTIES AND USES.—The whole of the species of this very extensive family are perfectly harmless, and their main feature is a slight astringency, while the fruit of some are eatable. The leaves of *Melastoma malabathrica*, a native of India, are astringent, and are good in cases of diarrhœa, dysentery, and hemorrhœa. The berries are juicy, and, when eaten, stain the lips black, hence the origin of the generic name, which signifies black-mouth. The bark of many species of *Medinilla* is mucilaginous, and the inhabitants of the Moluccas use it for emollient plasters in loose joints and tumours. The fibres of the roots bruised are said to heal fresh wounds, and are employed against the bites of serpents and those of the fish called Maluhu or Waruhu. The leaves are cooked along with fish, for their agreeable acid flavour. *Osbeckia chinensis* is also used for emollient plasters. The bark of *Astronia papetaria*, a native of the Moluccas, is astringent, but the leaves are acid; both are cooked or bruised with sago by the natives, and applied externally to healing of recent wounds. The leaves are also used as a condiment with fish, to which they communicate an agreeable acid flavour. The wood of old trees is pretty hard, and is used for door-posts. Pregnant women bruise the root of *Olanthera moluccana*, and after mixing it with the white of egg and water, drink it as a preventive of abortion. The berries are eatable, and have an agreeable acid taste. The berries of *Tristemma*

virusanum have a grateful taste, and are administered as a cure for syphilis in the Mauritius.

A decoction of *Chaetogastra canescens* is drunk by the Peruvians in dysuria, and is also esteemed for its virtues as a lithontriptic. The leaves of *Tibouchina aspera*, in the state of infusion, are administered as a cure for coughs; and an infusion of *Cremanium theezans* is used in Peru as a substitute for Chinese tea; and the same use is made of the flowers of *Meriana rosea* in Jamaica. The berries of *Clidemia hirta*, a native of Jamaica, are juicy, refrigerant, and antibilious. With the fruit of *Heterotrichium angustifolium* mixed with lemon-juice, a drink is made in the Antilles, which is given in inflammatory diseases, and against bilious attacks arising from over-indulgence. The leaves of some species of *Memecylon* furnish a yellow colour; the berries are acid, moderately astringent, and have an agreeable taste; those of *M. edule* being eaten by the natives of Coromandel. The wood of *Mouriria myrtilloides* is hard, tough, heavy, and good for looms, handles, staves for oars, &c.; and the bark is smooth and grey, with some very white spots, whence the genus is named *Silver-wood*. The flowers of *Guildingia psidioides* have a disagreeable smell, and the pulp of the berries is nau-eous; but the seeds resemble in taste the kernel of a hazelnut. The berries of *Myrrhinium atropurpureum* are eatable. Many of this family yield colouring properties; those whose bark furnish black are *Osbeckia princeps*, *Lasiandra argentea*, *Rhynchanthera grandiflora*, and *Miconia longifolia*. Those which yield yellow are *Cremanium reclinatum*, *C. tinctorium*, and *Miconia tinctoria*. The juice of the berries of *Blakea parasitica* dye red, and those of *Tococca guianensis* supply an abundance of black juice, which may be used as a writing ink.



ORDER XCV.—COMBRETACEÆ—COMBRETS.

TREES or shrubs, sometimes climbing. *Leaves* alternate or opposite, simple, and without leaflets at their base. *Flowers* hermaphrodite, regular. *Calyx* adherent to the ovary, with four to five lobes. *Corolla*, Fig. A, with four to five petals inserted in the orifice of the calyx. *Stamens* equal in number to that of the petals, often double the number, rarely triple, and inserted with them. *Ovary* inferior, one-celled, two to five ovuled, often crowned with an annular disk. *Style* and *Stigma* simple. *Fruit* nut-like, and sometimes winged, as in *Combretum*, Fig. B. *Seeds* pendulous, without albumen. *Embryo* straight, with the radicle directed towards the hilum, a minute plumule, and fleshy or leafy seed-lobes irregularly or longitudinally plaited, or spirally twisted.

TRIBE 1. *Poivreæ*.—Stamens ten. Seed-lobes leafy and twisted spirally.

GENERA AND SYNONYMS.

<i>Laguneularia</i> , Gärt.	<i>Brugniera</i> , Thouars.
<i>Sphenocarpus</i> , Rich.	<i>Funkia</i> , Dennst.
<i>Horan</i> , Ad.	<i>Guiera</i> , Ad.
<i>Lummitzera</i> , W.	<i>Poivreia</i> , Comm.
<i>Pyrrhanthus</i> , Jack.	<i>Cristaria</i> , Sonner.
<i>Petaloma</i> , Roxb.	<i>Gonocarpus</i> , Hamilt.

TRIBE 2. *Combretææ*.—Stamens eight or ten. Embryo with the seed-lobes fleshy, and irregularly or longitudinally plaited.

GENERA AND SYNONYMS.

<i>Combretum</i> , Löffl.	<i>Schousbæa</i> , W.
<i>Aetia</i> , Ad.	<i>Hambergera</i> Scop.
<i>Forsgardia</i> , Fl. Fl.	<i>Hambergeria</i> , Neck.
<i>Cacoucia</i> , Aub.	<i>Quisqualis</i> , Rumph.
<i>Agathisanthes</i> , Bl.	<i>Bigamea</i> , Kön.
<i>Ceratostachys</i> , Bl.	<i>Wormia</i> , Vahl.



Fig. 120. *Poivreia purpurea*.

Spalanthus, Jack.
Chrysostachys, Pohl.

Agathisanthes, Bl.
Ceratostachys, Bl.

Bigamea, Kön.
Wormia, Vahl.

GEOGRAPHICAL DISTRIBUTION.—These are all found exclusively in the tropics of Asia, Africa, and America.

PROPERTIES AND USES.—The whole family are astringent. *Poivreia alternifolia* has a very clammy juice, which is used in South America as a substitute for glue. The immature seeds of *Quisqualis indica* are used as a vermifuge, and are eaten when ripe. The leaves have a stinking smell, and taste like radish.

ORDER XCVI.—ALANGIACEÆ—ALANGIS.

LARGE trees, often spiny.

Leaves alternate, entire, without dots, and without leaflets at their base. *Flowers* hermaphrodite, regular. *Calyx* adherent with the ovary, with from five to ten teeth, rarely six to eight. *Corolla* with petals equal in number to the teeth of the calyx. *Stamens* long, double or quadruple the number of the petals; *filaments* free, and hairy at the base; *anthers* linear, bursting inwards by a longitudinal cleft; often barren. *Ovary* inferior, with one or two cells, each containing one ovule attached to the top of the cell. *Style* thread-like, simple, longer than the stamens. *Fruit* a drupe, Fig. A, fleshy, containing one to two bony nuts, Figs. B and C. *Seed* inverted, ovate, with fleshy albumen. *Embryo* straight, with a long superior radicle directed towards the hilum, and flat leafy seed-lobes.



Fig. 121. *Alangium decapetalum*.

GENERA AND SYNONYMES.

<i>Alangium</i> , Lam.		<i>Angolamia</i> , Scop.		„ <i>Stylidium</i> , Lour.		„ <i>Pautsavia</i> , Juss.
<i>Angolam</i> , Ad.		<i>Marlea</i> , Roxb.		<i>Stylis</i> , Poir.		<i>Diacæcarpium</i> , Bl

GEOGRAPHICAL DISTRIBUTION.—These extend over the continent and islands of India, even to the base of the Himalayas.

PROPERTIES AND USES.—The virtues of this family are purgative and hydragogue. Their roots are aromatic; their fruit eatable, but mucilaginous and insipid; and their wood valuable.



ORDER XCVII.—CORNACEÆ—CORNELS.

TREES, shrubs, and rarely herbs. *Leaves* opposite, rarely alternate,



Fig. 122. *Benthamia fragifera*.

simple, without leaflets at their base. *Flowers* hermaphrodite, rarely unisexual from abortion, sometimes accompanied with petal-like leaves on the outside. *Calyx* adhering to the ovary, with four lobes. *Corolla* with four petals inserted in the orifice of the calyx, regular. *Stamens* equal in number with the petals, alternate with and inserted along with them. *Ovary* inferior, with two or three one-ovuled cells. *Style* simple. *Stigma* capitate. *Fruit* a drupe, fleshy, with a two or three-celled bony nut, or one-celled and one-seeded by abortion. *Seed* pendulous, solitary in the cells. *Albumen* fleshy, containing an embryo with a superior radicle, which is shorter than the two oblong seed-lobes.

GENERA AND SYNONYMES.

Benthamia, *Lindl.*

Cornus, *T.*

Aueuba, *Th.*

Eubasis, *Sol.*
Decostea, *R. & P.*
Pukateria, *Raoul.*
Corokia, *Cunn.*

Curtisia, *Ait.*
Doratium, *Sol.*
Relhania, *Gm.*

Junghansia, *Gm.*
Sideroxylon, *Bur.*
Mastixia, *Bl.*

Votomita, *Aub.*
Glossocoma, *Schr.*
Guilleminia, *Nck.*

GEOGRAPHICAL DISTRIBUTION.—This family inhabits the temperate and cold regions of the northern hemisphere, particularly of North America and Nepaul; but they are rare in tropical America, and between the tropics of Asia and Africa, and to the south of which they have not been met with.

PROPERTIES AND USES.—In the bark of some an astringent principle is found, which is useful in fevers; the sweet acid fruit of others is eatable, and the seeds are oily. *Common Dogwood* (*Cornus sanguinea*) is a native of Britain, and may often be seen cultivated in shrubberies. It is known by many popular names, as *Female Cornel*, *Dogberry tree*, *Hound tree*, *Hound's berry*, *Prick-wood*, *Gatten tree*, *Catteridge tree*, and *Wild Cornel*. Chaucer calls the fruit *Gaitres berries*. The fruit is dark purple, and very bitter, and an oil is obtained from the seeds by pressure, which, according to Matthioli, is used for lamps, in the country near Trent. The wood is hard, and furnishes excellent skewers for butchers, toothpicks, and

cogs for wheels; it makes excellent charcoal, esteemed for gunpowder, and the bark tastes of apples. A decoction of the bark and leaves is used in France to destroy bugs. *C. circinnata* is a native of Canada and the United States. The fruit is lead-coloured, and is called by the Crees *Musquameena*, because the bears fatten upon them; they are also eaten by pigeons. The bark, when dried, affords a powder resembling Ipecacuanha, and has a bitter, astringent, and aromatic taste. It has been much used in the United States as a tonic and astringent, in the form of an infusion, made by pouring a pint of boiling water on an ounce of the coarsely-powdered bark, and taken in doses of one to two fluid drachms. The bark of *C. sericea*, a native of North America, is sometimes employed in medicine, for its tonic and astringent properties.

Cornus mas, or *Cornelian Cherry*, is found throughout the whole of Europe, with the exception of Great Britain. It is much cultivated on the continent as a fruit shrub, for the sake of its berries, which are oval, about the size of a horse-bean, of a beautiful cornelian-red colour; when immature they are astringent, but when they are fully ripe, and particularly when they are allowed to hang till they fall from the tree, they are sweet, and may be eaten when raw, or preserved in the form of marmalade, like cherries; in this form they are said to strengthen the stomach, and to be very useful in cases of diarrhœa; but those subject to constipation should avoid them. They are much used by the Turks in their sherbets. The unripe fruit is also pickled with salt and vinegar, and used as olives, when they are said to have a pleasant taste, and excite an appetite. The leaves have been used on the continent as a substitute for tea, and those who have used the infusion say that it is very wholesome and agreeable. The wood is extremely hard, and is used on the continent for wooden forks, which are made by selecting branches which divide into three near the extremity, and after cutting the branch to a proper length, which is commonly about five or six feet, the bark is taken off, and the three branches which are to form the prongs are bent, so as to form a triangle, like the wooden corn forks of England; they are then put into an oven and kept there until they are hardened. The wood is also used for butchers' skewers, hoops, and tooth-picks. *C. florida* is a native of North America, and is the most ornamental species of the genus. The fruit is small and of no use, but the bark is held in great estimation by the medical practitioners of the United States, for its tonic and astringent properties, the virtues of which are supposed to reside in a peculiar principle which it contains called *Corrine*. Its action is similar to that of Peruvian bark, and it has been found successful in cases of intermittent fever, and also in typhoid fevers. Barton says that the young branches stripped of their bark and rubbed with their ends against the teeth render them extremely white. From the bark of the more fibrous roots, the Indians obtain a good scarlet colour. The berries of *C. suecica*, a herbaceous plant, growing in alpine districts of Great Britain, are eaten by the Highlanders to create an appetite, and hence they call it *Lus-achrasis*, or plant of gluttony. *Benthamia fragifera*, a native of Nepaul and Japan, produces a large fruit, in the form of a strawberry, which, however, is of no value. For the uses to which *Curtisia faginea* is applied, see page 231.

ORDER XCVIII.—HAMAMELIDACEÆ—WITCH HAZELS.

SHRUBS. *Leaves* alternate, simple, with two leaflets at their base.



Fig. 123. *Hamamelis virginica*.

Flowers hermaphrodite, or unisexual by abortion. *Calyx* adhering to the ovary, four-lobed. *Corolla* with four petals, linear, elongated, inserted in the calyx, and alternating with their lobes; rarely wanting, as in *Fothergilla*. *Stamens* eight, four of which are fertile, alternate with the petals, and four opposite them, destitute of anthers; *filaments* short; *anthers* two-celled, bursting in various ways. *Ovary*, Fig. A, inferior, two-celled; *cells* with one or several pendulous ovules. *Styles* two, very rarely three, surmounted by a simple stigma. *Fruit* a capsule, opening in two valves. *Seed* pendulous, with a superior hilum, and horny albumen. *Embryo* straight, slender, with a superior radicle, and flat, leafy seed-lobes, having their margins rather turned in.

TRIBE 1. *Hamameleæ*.—Ovules solitary. Flowers perfect.

OENERA AND SYNONYMES.

<i>Dicoryphe</i> , <i>Thou.</i>	<i>Dahlia</i> , <i>Th.</i>
<i>Dicorypha</i> , <i>Sp.</i>	<i>Hamamelis</i> , <i>L.</i>
<i>Corylopsis</i> , <i>S. & Z.</i>	<i>Trilopus</i> , <i>Mitch.</i>
<i>Trichocladus</i> , <i>Pers.</i>	<i>Loropetalum</i> , <i>R. Br.</i>

TRIBE 2. *Fothergilleæ*.—Ovules solitary. Flowers without petals.

OENERA.

<i>Parriottia</i> , <i>C. A. M.</i>	<i>Fothergilla</i> , <i>L. fl.</i>	<i>Distylium</i> , <i>Zucc.</i>
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TRIBE 3. *Bucklandia*.—Ovules several in each cell.

<i>Bucklandia</i> , <i>R. Br.</i>	<i>Sedgwickia</i> , <i>Griff.</i>
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GEOGRAPHICAL DISTRIBUTION.—The few species which compose this order are distributed over North America, Japan, China, India, Persia, Madagascar, and Africa.

PROPERTIES AND USES.—The only plant in the family which furnishes any useful products is *Hamamelis virginica*, or *Virginian Witch Hazel*, the bark of which is used by the North American Indians as a sedative and discutient, to painful tumours and external inflammation; and a cataplasmi of the inner bark is found to be very efficacious in removing painful inflammations of the eyes.

ORDER XCIX.—BRUNIACEÆ—BRUNIA FAMILY.

HEATH-LIKE plants. *Leaves* small, smooth, entire, sometimes imbricated.

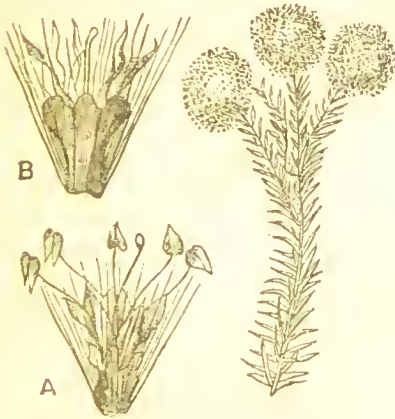


Fig. 124. *Brunia lanuginosa*.

Flowers hermaphrodite, regular, small, arranged in heads, rarely in panicles; each of the flowers has three bracts at its base. *Calyx* adhering to the ovary, rarely free, as in *Raspailia*, five-lobed, or five-cleft, imbricate in æstivation. *Corolla*, Fig. A, with five imbricate petals, inserted in the throat of the calyx, and alternating with its lobes. *Stamens* five, alternating with the petals; the filaments adhering laterally with the base of each of the petals; *anthers* two-celled, bursting inwards. *Ovary* half-inferior, or inferior, with one to three cells, each containing one to two collateral and suspended ovules. *Style* simple, or two-cleft, or two distinct styles, each terminated by a very small stigma. *Fruit*, Fig. B, dry, crowned by the

calyx, corolla, and stamens, which are persistent; it is either unopening or separating into two generally one-seeded nuts, opening by a longitudinal and internal suture. *Seeds* suspended, containing a very small embryo, placed in the apex of a fleshy albumen, with short seed-lobes, and a long, conical radicle.

GENERA AND SYNONYMES.

<i>Berzelia</i> , Brongn.	<i>Astrocoma</i> , Neck.	<i>Tittmannia</i> , Brongn.	<i>Ophira</i> , L.
<i>Brunia</i> , Brongn.	<i>Berardia</i> , Brong.	<i>Mosslera</i> , Reichb.	<i>Grubbia</i> , Berg.
<i>Nebelia</i> , Neck.	<i>Nebelia</i> , Sweet.	<i>Thamnea</i> , Sol.	<i>Strobilocarpus</i> ,
<i>Beckea</i> , Burm.	<i>Linconia</i> , L.	<i>Heterodon</i> , Meisn.	[Klotsch.
<i>Raspailia</i> , Brongn.	<i>Audouinia</i> , Brongn.	<i>Gravenhorstia</i> Nees	<i>Lonchostoma</i> ,
<i>Staavia</i> , Th.	<i>Pavinda</i> , Th.	<i>Erasma</i> , R. Br.	[Wikstr.
<i>Levisanus</i> , Schrb			

These are all found at the Cape of Good Hope, and there are no uses to which any of them are known to have been applied, nor any products they are known to yield.



ORDER C.—UMBELLIFERÆ—UMBELFLOWERS.

HERBACEOUS, very rarely shrubby plants. *Leaves* alternate, very seldom

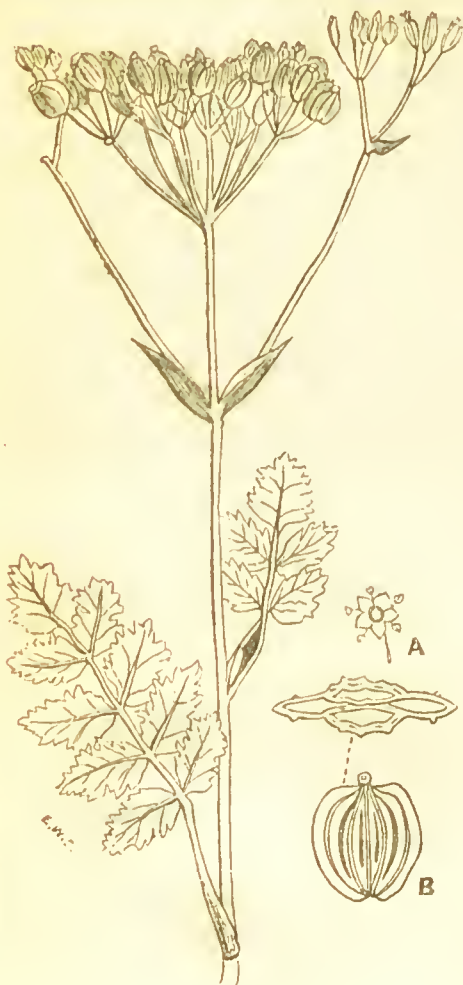


Fig. 125. *Pastinaca sativa*—Common Parsnip, in fruit.

opposite or entire, most usually divided into deep segments, and the footstalks sheathing the stem, at the base. *Flowers* generally hermaphrodite, but sometimes unisexual, arranged in simple or compound umbels, Fig. 125, accompanied with a wrapper (involucre). *Calyx* adhering to the ovary with five generally very short teeth, or entire. *Corolla*, Fig. A, with five distinct petals, inserted in the top of the calyx, and alternating with its teeth; either entire or notched at the margin, or two-lobed, flat, or somewhat rolled up. *Stamens* five, inserted with the petals and alternating with them, always distinct; *Anthers* ovate, two-celled, opening by a double longitudinal chink. *Ovary* inferior, with two one-ovuled cells. *Styles* two, distinct. *Stigmas* simple. *Fruit*, Fig. B, composed of two dry carpels, rarely fleshy, one-seeded, unopening, and separating at maturity by the base into two parts, each traversed by five primary and four secondary elevated ridges, separated by furrows, under which are often placed linear chambers containing essential oil, and called vittæ. *Seeds* solitary in each carpel, hanging from the top of the axis. *Albumen* large, fleshy, or rather horny. *Embryo* minute, with a superior radicle.

SUB-ORDER I.—ORTHOSPERMÆ.

Albumen flat or flattish inside, neither involute nor convolute.

§ 1. *Umbels simple or imperfect. Fruit without oil-chambers.*

TRIBE 1. *Hydrocotyleæ*.—Fruit contracted from the sides; carpels convex or acute on the back, with five primary ribs, at length obsolete; lateral ones on the margin or the face which is flat. Petals entire.

GENERA AND SYNONYMES.

Hydrocotyle, <i>T.</i>	Erigenia, <i>Nutt.</i>	Pritzelia, <i>Walp.</i>	Chamitis, <i>Sol.</i>
Chondrocarpus,	Micropleura, <i>Legu.</i>	Astrotricha, <i>DC.</i>	Siebera, <i>Reichb.</i>
[<i>Nutt.</i>	Didiscus, <i>DC.</i>	Leucolæna, <i>R. Br.</i>	Fragosa, <i>R. & P.</i>
Glyceria, <i>Nutt.</i>	Lampra, <i>Lindl.</i>	Xanthosia, <i>Rudg.</i>	Pectophytum, <i>H. B.</i>
Centella, <i>L.</i>	Hügelia, <i>Reichb.</i>	Cruciella, <i>Lesch.</i>	[<i>K.</i>
Solandra, <i>L. f.</i>	Trachymene, <i>Rudg.</i>	Pentapeltis, <i>Endl.</i>	Microsciadium,
Crantzia, <i>Nutt.</i>	Azorella, <i>Labill.</i>	Schænolæna, <i>Bunge.</i>	[<i>Hook. f.</i>
Cesatia, <i>Endl.</i>	Fischera, <i>Sp.</i>	Bowlesia, <i>R. & P.</i>	Haplosciadium,
Dimetopia, <i>DC.</i>	Catepha, <i>Leschen.</i>	Azorella, <i>Lam.</i>	[<i>Hochst.</i>

TRIBE 2. *Mulineæ*.—Carpels contracted at the face (commissure) flat or flattish on the back, without oil-chambers.

GENERA AND SYNONYMES.

Bolax, <i>Comm.</i>	Dipterygia, <i>Pr.</i>	Homalocarpus, <i>H. & A.</i>	Pozoa, <i>Legasc.</i>
Mulinum, <i>Pers.</i>	Laretia, <i>Gill. & H.</i>	Diposis, <i>DC.</i>	Schizilema, <i>Hook. f.</i>
Asteriscium, <i>C. & S.</i>	Drusa, <i>DC.</i>	Spananthe, <i>Jacq.</i>	Diplaspis, <i>Hook. f.</i>
Cassidocarpus,	Huanaca, <i>Cav.</i>		Pozopsis, <i>Hook. f.</i>
[<i>Presl.</i>			

TRIBE 3. *Saniculeæ*.—Fruit ovato-globose. Carpels with five primary ribs, and destitute of oil-chambers; secondary ribs wanting or obliterated by being covered with scales. Petals erect, notched at the margin.

GENERA AND SYNONYMES.

Actinotus, <i>Labil.</i>	Klotschia, <i>Cham.</i>	Astrantia, <i>T.</i>	Horsfieldia, <i>Bl.</i>
Eriocalia, <i>Sm.</i>	Sanicula, <i>T.</i>	Alepidia, <i>Laroch.</i>	Schubertia, <i>Bl.</i>
Proustia, <i>Legasc.</i>	Sanicoria, <i>DC.</i>	Actinolema, <i>Fenzl.</i>	Actinanthus, <i>Ehrb.</i>
Holotome, <i>Benth.</i>	Hacquetia, <i>Neck.</i>	Eryngium, <i>T.</i>	Hohenackeria <i>F&M</i>
Petagnia, <i>Guss.</i>	Dondia, <i>Sp.</i>	Lessonia, <i>Bert.</i>	Hemiphues, <i>Hook. f.</i>
Heterosciadium,	Dondisia, <i>Reichb.</i>	Strebanthus, <i>Raf.</i>	
[<i>DC.</i>			

§ 2. *Umbels compound or perfect; oil-chambers on the fruit, variable, rarely wanting.*

* Carpels having only primary ribs.

TRIBE 4. *Ammineæ*.—Fruit compressed from the sides, or didymous. Carpels with five thread-like ribs, which at length become a little winged; lateral ones marginating, all equal. Seeds cylindrical or convex on one side, flattish in front.

GENERA AND SYNONYMES.

Rumia, <i>Hoffm.</i>	Apinella, <i>Neck.</i>	Discoleura, <i>DC.</i>	Gymnosciadium,
Cicuta, <i>L.</i>	Spielemannia <i>Guss.</i>	Ptilimnium, <i>Raf.</i>	[<i>Hochst.</i>
Zizia, <i>Koch.</i>	Helosciadium, <i>Koch.</i>	Leptocaulis, <i>Nutt.</i>	Microsciadium,
Smyrnium, <i>Ell.</i>	Sium, <i>Ad.</i>	Spermolepis, <i>Raf.</i>	[<i>Boiss.</i>
Thaspium, <i>Nutt.</i>	Elarosticta, <i>Fenzl.</i>	Ptychotis, <i>Koch.</i>	Critamus, <i>Bess.</i>
Apium, <i>Hoffm.</i>	Mauchartia, <i>Neck.</i>	Bunium, <i>Legasc.</i>	Falcaria, <i>Rivin.</i>
Euapium, <i>DC.</i>	Cyclospermum,	Ammoides, <i>Ad.</i>	Drepanophyllum
Oreosciadium <i>DC.</i>	[<i>Legasc.</i>	Trachyspermum,	[<i>Huffm.</i>
Petroselinum, <i>Hoff.</i>	Trachysciadium,	[<i>Link.</i>	Prionitis, <i>Delarb.</i>
Wyndleria, <i>DC.</i>	[<i>DC.</i>	Ammios, <i>Manch.</i>	Iladnickia, <i>Reichb.</i>
Arnia, <i>Hoffm.</i>	Callistroma, <i>Fenzl.</i>	Heteropterycha <i>DC.</i>	Sison, <i>Legasc.</i>

Schultzia, <i>Sp.</i>	Conopodium, <i>DC</i>	Reutera, <i>Boiss.</i>	Diatropa, <i>Dum.</i>
Amni, <i>T.</i>	Deringa, <i>Ad.</i>	Berula, <i>Koch.</i>	Trachypleurum,
Visnaga, <i>Gärt</i>	Chamæsciadium,	Sium, <i>Koch.</i>	[<i>Reichb.</i>
Gohoria, <i>Neck.</i>	[<i>Mey.</i>	Sisarum, <i>Ad.</i>	? Osimaria, <i>Raf.</i>
Ægopodium, <i>L.</i>	Cryptotænia, <i>DC.</i>	Ridolfia, <i>Moxi.</i>	Atenia, <i>Hook & A.</i>
Podagraria, <i>Riv.</i>	Cyrtospermum,	Muretia, <i>Boiss.</i>	? Edosmia, <i>Nutt.</i>
Carum, <i>Koch.</i>	[<i>Raf.</i>	Bupleurum, <i>S.</i>	Neurophyllum, <i>T. & G.</i>
Elwendia, <i>Boiss.</i>	Alacospermum,	Agostana, <i>Sol.</i>	[<i>G.</i>
Sympodium, <i>Koch.</i>	[<i>Neck.</i>	Diaphyllum,	Heteromorpha, <i>Ch. & S.</i>
Bulboecastanum,	Lereschia, <i>Boiss.</i>	[<i>Hoffm.</i>	[<i>S.</i>
[<i>Ad.</i>	Pimpinella, <i>L.</i>	Isophyllum <i>Hoffm</i>	Furnrohria, <i>Koch.</i>
Lomatocarium, <i>Fsch</i>	Tragoselinum, <i>T.</i>	Tenoria, <i>Sp.</i>	Petrosciadium,
Bunium, <i>Koch.</i>	Tragium, <i>Sp.</i>	Buprestis, <i>Sp.</i>	[<i>Edgw.</i>
Chrysæum, <i>DC.</i>	Ledeburia, <i>Lk.</i>	Odonites, <i>Sp.</i>	Acronema, <i>Falc.</i>
Caroides, <i>DC.</i>	Anisum, <i>Ad.</i>		

TRIBE 5. *Seselineæ*.—Fruit cylindrical or nearly so; or the carpels are rather compressed on the back, with five thread-like or winged ribs; the lateral ones marginating, equal to the others or broader. Seeds cylindrically convex on the back.

GENERA AND SYNONYMES.

Lichtensteinia, <i>Ch.</i>	Kundmannia, <i>Scop.</i>	Eriotis, <i>DC.</i>	Aciphylla, <i>Forst.</i>
[<i>& S.</i>	Brignolia, <i>Bert.</i>	Xatardia, <i>Meisn.</i>	Gingidium, <i>Forst</i>
Ottoa, <i>H. B. K.</i>	Campderia, <i>Legas</i>	Petitia, <i>Gay.</i>	Anisotome, <i>Hook. f.</i>
Oenanthe, <i>Lam.</i>	Deverra, <i>DC.</i>	Cenolophium, <i>Koch</i>	Trachydium, <i>Lindl.</i>
Phellandrium, <i>L.</i>	Pithyranthus <i>Fiv</i>	Dethawia, <i>Endl.</i>	Silaus, <i>Bess.</i>
Ilaplosciadium,	Soranthus, <i>Ledeb.</i>	Wallrothia, <i>DC.</i>	Meum, <i>T.</i>
[<i>Hochst.</i>	Eriocyela, <i>Lindl.</i>	Cnidium, <i>Cuss.</i>	Endressia, <i>Gay.</i>
Platysace, <i>Bunge.</i>	Seseli, <i>L.</i>	Selinum, <i>Legasc.</i>	Neogaya, <i>Meisn.</i>
Chamarea, <i>E. & Z.</i>	Marathrum, <i>Raf.</i>	Hymenidium, <i>Lindl</i>	Gaya, <i>Gaud.</i>
Anesorrhiza, <i>Ch. & S.</i>	Musineon, <i>Raf.</i>	Thaspium, <i>Nutt.</i>	Pachypleurum,
Anisopleura, <i>Fenzl.</i>	Hippomarath-	Trochiscanthus <i>Koch</i>	[<i>Reichb.</i>
Sclerosciadium,	[rum, <i>Riv.</i>	Athamantha, <i>Koch.</i>	Arpitium, <i>Neck.</i>
[<i>Koch.</i>	Elæochytris, <i>Fenzl.</i>	Tinguara, <i>Parl</i>	Conioselinum, <i>Fsch</i>
Dasyloma, <i>DC.</i>	Polemannia, <i>E. & Z.</i>	Turbeth, <i>Tausch.</i>	Czernæwia, <i>Trcz</i>
Cynosciadium, <i>DC.</i>	Libanotis, <i>Crantz.</i>	Libanotis, <i>Scop.</i>	Crithmum, <i>T.</i>
Æthusa, <i>L.</i>	Athamantha <i>Scop</i>	Ligusticum, <i>L.</i>	Lithosciadium, <i>Trcz</i>
Fœniculum, <i>Ad.</i>			

TRIBE 6. *Angeliceæ*.—Fruit compressed from the back, girded by two wings on each side, from the carpels-stalks being central. Carpels furnished with five ribs, the three dorsal ribs thread-like or winged, and the two lateral ones always expanded into wings, and broader than the dorsal ones. Seeds rather convex on the back, and flattish in front.

GENERA AND SYNONYMES.

Levisticum, <i>Koch.</i>	Thyselimum, <i>Ad.</i>	Angelica, <i>Hoffm.</i>	Tetrapleura, <i>Parl</i>
Ligusticum, <i>Legas</i>	Carvifolia, <i>Vaill.</i>	Archangelica <i>Hoffm</i>	Thomassinia, <i>Bert.</i>
Selinum, <i>Hoffm.</i>	Ostericum, <i>Hoffm.</i>	Tornabenca, <i>Webb.</i>	Oreocome, <i>Edgw.</i>
Mylinum, <i>Gaud.</i>			

TRIBE 7. *Peucedaneæ*.—Fruit compressed from the back like a lens, girded by a smooth, winged, flattened, or rather convex, dilated, entire margin. Carpels with five thread-like ribs, rarely winged; lateral ribs contiguous to the dilated margin, or lost in it; carpel-stalks marginal, hence the fruit is only furnished with one wing on each side, not with two wings,

as in the last tribe, where the carpel-stalks are central. Seeds flattened, or rather convex at the back.

GENERA AND SYNONYMES.

Opoponax, Koch.	Selinoides, DC.	Anethum, T.	Heracleum, L.
Ferula, T.	Oreoselinum,	Cortia, DC.	Spondylium, T.
Ferulago, Koch.	[Duby.	Hammatocaulis,	Tetractenium DC
Lomatium, Raf.	Angelicoides, DC	[Tausch	Carmelia, DC.
Cogswellia, Schlt.	Imperatoria, L.	Capnophyllum, Grt	Wendtia, Hoffm.
Polycyrtus, Schlet.	Euryptera, Nutt.	Rumia, Link	Trychogonium,
Dorema, Don.	Leptotænia, Nutt.	Tiedemannia, DC.	[DC.
Eriosynaphe, DC.	Sciothamnus, Endl.	Oxypolis, Raf.	Barysoma, Bung.
Peucedanum, L.	Dregea, E. & Z.	Archemora, DC.	Zozimia, Hoffm.
Galimbia, Bess.	Xanthogalum, Lal.	Pastinaca, T.	Polytænia, DC.
Pteroselinum,	Cynorrhiza, E. & Z.	Malabaila, Hoff.	Eurytænia, Nutt.
[Reichb.	Callisace, Fisch.	Lophotænia, Griseb.	Ducrosia, Boiss.
Selinum, Gärt.	Bubon, L.	Leiotulus, Ehrenb.	Trigonosciadium,
Caroselinum,	Galbanophora,	Astydamia, DC.	[Boiss.
[Grise.	[Nutt.	Symphiloma, Mey.	Johrenia, DC.
Thysselinum, DC	Agasillis, Sp.	Stenotænia, Boiss.	Diplotæia, Boiss.
Cervaria, Gärt.	Lefeburia, A. Rich.		

TRIBE 8. *Tordylieæ*.—Fruit compressed like a lens, or flatly compressed from the back, girded by a thickened, knobbed, or plaited dilated margin. Carpels with five very fine or obsolete ribs; lateral ones contiguous to the dilated margin, or forming the same. Seeds flattened.

GENERA AND SYNONYMES.

Hasselquistia, L.	Synleosciadium, Boiss.	Narthex, Falc.
Ainsworthia, Bois.	Tordyliopsis, DC.	Steganotænia, Hochst.
Tordylum, T.	Tordylioides, Wall.	Scorodosma, Bunge.
Condyllocarpus, Hoffm		

** *Carpels furnished with both primary and secondary ribs.*

TRIBE 9. *Sileridæ*.—Fruit compressed from the back like a lens. Carpels with five primary ribs; the lateral ones marginating, and usually with four secondary less prominent ones; all thread-like and wingless. Seeds flattish in the front.

GENERA AND SYNONYMES.

Agasyllis, Hoffm.	Pachypleurum, Ledeb.	Phloiodicarpus, Turcz.
Kruberia, Hoffm.	Stenocclium, Ledeb.	Galbanum, Don.
Ulosperrum, Link.	Siler, Scop.	Ormosolenia, Tausch.
Capnophyllum Legase	Bradlaia, Neck.	Polyzygus, Dalz.

TRIBE 10. *Cumineæ*.—Fruit contracted from the sides. Carpels with five thread-like primary ribs, the lateral ones of these marginating; and with four secondary, more prominent ones; all wingless. Seeds straight, flattish in front.

GENERA.

Cuminum, L.	Froriepia, Koch.	Trepocarpus, Nutt.
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TRIBE 11. *Thapsicæ*.—Fruit compressed from the back. Carpels with five thread-like primary ribs, which are now and then bristly; lateral ones seated on the flat face (commissure); four secondary ones. the inner of

which are thread-like, and the outer, or all, are winged. Wings undivided, hence the fruit is either eight-winged, or furnished with two wings on each side. Seeds flattish, or cylindrically convex, flat in front.

GENERA AND SYNONYMES.

Thapsia, <i>T.</i>	Leptoenemia, <i>Nutt.</i>	Siler, <i>Münch.</i>
Cymopterus, <i>Raf.</i>	Pterixia, <i>Nutt.</i>	Lophosciadium, <i>DC.</i>
Thapsia, <i>Nutt.</i>	Polyophium, <i>Boiss.</i>	Melanoselinum, <i>Hoffm.</i>
Phyllopterus, <i>Nutt.</i>	Laserpitium, <i>T.</i>	

TRIBE 12. *Daucineæ*.—Fruit compressed from the back like a lens. Carpels with five bristly, thread-like, primary ribs, the lateral ones of which are seated in the flat face, as in the last tribe; and with four secondary ones, which are more prominent and prickly, the prickles either free or joined into a wing. Seeds flattish, or inclining to cylindrical, or convex on the back and flattish in front.

GENERA AND SYNONYMES.

Artedia, <i>L.</i>	Gaytania, <i>Munter.</i>	Durîæa, <i>Boiss.</i>
Orlaya, <i>Hoffm.</i>	Chesneya, <i>Bertol.</i>	Platyspermum, <i>Hoffm.</i>
Daucus, <i>T.</i>	Agrocharis, <i>Hochst.</i>	Anisaetis, <i>DC.</i>

SUB-ORDER II.—CAMPYLOSPERMÆ.

Albumen involute, or marked by a longitudinal furrow or channel on the inner side.

§ 1. *Carpels furnished with both primary and secondary ribs.*

TRIBE 13. *Elæoselineæ*.—Fruit cylindrical, more compressed from the back than from the sides. Carpels with five thread-like primary ribs, and four secondary ones; the two dorsal ones of these last are nerve-formed, but the two lateral are expanded into a wing, each with the margins nerve or rib-formed. Seeds involute, crescent-shaped.

GENERA.

Elæoselinum, <i>Koch.</i>	Margotia, <i>Boiss.</i>
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TRIBE 14. *Caucalidæ*.—Fruit contracted from the sides, or nearly cylindrical. Carpels with five thread-like, bristly, or prickly, primary ribs, of which the lateral ones are seated on the flat face; the four secondary are more prominent, and very prickly. Seeds involute, or inflexed on the margin.

GENERA AND SYNONYMES.

Szovitsia, <i>F. & Mey.</i>	Psammogeton, <i>Edgw.</i>	Lisæa, <i>Boiss.</i>
Caucalis, <i>L.</i>	Torilis, <i>Ad.</i>	Trichocarpæa, <i>DC.</i>
Turgenia, <i>Hoffm.</i>	Turgeniopsis, <i>Boiss.</i>	

§ 2. *Carpels furnished with primary ribs only.*

TRIBE 15. *Scandiceæ*.—Fruit evidently compressed, or contracted from the sides, usually beaked. Carpels with five thread-like ribs, which are at length winged; lateral ribs marginating, all equal, but sometimes all

obliterated at the base, and only conspicuous at the apex. Seeds cylindrically convex, having a deep furrow in front, or somewhat involute on the margin.

GENERA AND SYNONYMES.

<i>Scandix</i> , <i>Gärt.</i>	<i>Butinia</i> , <i>Boiss.</i>	<i>Biasoletia</i> , <i>Koch.</i>
<i>Peeten</i> , <i>DC.</i>	<i>Oreomyrrhis</i> , <i>Endl.</i>	<i>Osmorrhiza</i> , <i>Raf.</i>
<i>Wylia</i> , <i>Hoffm.</i>	<i>Caldasia</i> , <i>Legasc.</i>	<i>Uraspermum</i> , <i>Nutt.</i>
<i>Anthriscus</i> , <i>Hoffm.</i>	<i>Sphallerocarpus</i> , <i>Bess.</i>	<i>Spermatura</i> , <i>Reichb.</i>
<i>Chærophylloides</i> , <i>Leg.</i>	<i>Molopospermum</i> , <i>Koch.</i>	<i>Glycosma</i> , <i>Nutt.</i>
<i>Ceræfolium</i> , <i>Hall.</i>	<i>Velæa</i> , <i>DC.</i>	<i>Grammosciadium</i> , <i>DC.</i>
<i>Chærophylloides</i> , <i>L.</i>	<i>Tauschia</i> , <i>Schlecht.</i>	<i>Ozodia</i> , <i>W. & Arn.</i>
<i>Physocaulis</i> , <i>DC.</i>	<i>Myrrhis</i> , <i>Scop.</i>	<i>Heterotænia</i> , <i>Boiss.</i>
<i>Brachystylis</i> , <i>DC.</i>	<i>Freyera</i> , <i>Reichb.</i>	

TRIBE 16. *Smyrneæ*.—Fruit turgid, usually compressed or contracted from the sides. Carpels with five ribs; the lateral ones marginating, or situated in the front of the margin; the ribs sometimes almost obliterated. Seeds involute, or with a furrow on the inside, crescent-shaped or complicate.

GENERA AND SYNONYMES.

<i>Lagoecia</i> , <i>L.</i>	<i>Pteromarathrum</i> , [<i>Koch.</i>]	<i>Pleurospermum</i> , [<i>Hoff.</i>]	<i>Physospermum</i> , [<i>Cass.</i>]
<i>Oliveria</i> , <i>Vent.</i>	<i>Colladonia</i> , <i>DC.</i>	<i>Cælopleurum</i> , <i>Ledeb.</i>	<i>Danaa</i> , <i>Allion.</i>
<i>Anisosciadium</i> , <i>DC.</i>	<i>Perlebia</i> , <i>DC.</i>	<i>Hansenia</i> , <i>Turcz.</i>	<i>Henslera</i> , <i>Legasc.</i>
<i>Pyenocyela</i> , <i>Rayle.</i>	<i>Heptaptera</i> , <i>Reutt.</i>	<i>Physospermum</i> , [<i>Vcl.</i>]	<i>Keramocarpus</i> , <i>Fenzl.</i>
<i>Echinophora</i> , <i>T.</i>	<i>Meliocarpus</i> , <i>Bois.</i>	<i>Enymonosper-</i> [<i>mum</i> , <i>Sp.</i>]	<i>Opoidia</i> , <i>Lindl.</i>
<i>Dicyelophora</i> , <i>Bois.</i>	<i>Leeokia</i> , <i>DC.</i>	<i>Malabaila</i> , <i>Tausch.</i>	<i>Smyrniopsis</i> , <i>Bois.</i>
<i>Theocarpus</i> , <i>Bois.</i>	<i>Magydaris</i> , <i>Koch.</i>	<i>Hladniekia</i> , <i>Koch.</i>	<i>Anosmia</i> , <i>Bernh.</i>
<i>Exoacantha</i> , <i>Lab.</i>	<i>Eriocachrys</i> , <i>DC.</i>	<i>Grafia</i> , <i>Reichb.</i>	<i>Perideridia</i> , <i>Rehb.</i>
<i>Aretopus</i> , <i>L.</i>	<i>Hermas</i> , <i>L.</i>	<i>Eleutherospermum</i> [<i>Koch.</i>]	<i>Eulophus</i> , <i>Nutt.</i>
<i>Apradus</i> , <i>Ad.</i>	<i>Petrocarvi</i> , <i>Taus.</i>	<i>Hymenolæna</i> , <i>Wall.</i>	<i>Cynapium</i> , <i>Nutt.</i>
<i>Cachrys</i> , <i>T.</i>	<i>Conium</i> , <i>L.</i>	<i>Aulacospermum</i> , [<i>Led.</i>]	<i>Deweya</i> , <i>T. & G.</i>
<i>Ægomarathrum</i> , [<i>Koch.</i>]	<i>Cicuta</i> , <i>T.</i>		<i>Musenim</i> , <i>Nutt.</i>
<i>Hippomarathrum</i> [<i>Link.</i>]	<i>Vicatia</i> , <i>DC.</i>		<i>Sealigeria</i> , <i>DC.</i>
<i>Lophocachrys</i> , <i>DC.</i>	<i>Arracacha</i> , <i>Bauer.</i>		<i>Eremodaueus</i> , <i>Bung.</i>
<i>Prangos</i> , <i>Lindl.</i>	<i>Pentaerypta</i> , <i>Lehm.</i>		

SUB-ORDER III.—CÆLOSPERMÆ.

Albumen involutely curved from the base to the apex.

TRIBE 17. *Coriandree*.—Fruit globose, or of two somewhat globose carpels. Carpels furnished with five primary depressed, and flexuose ribs; lateral ribs placed before the accessory margin, and four more prominent secondary ones; all wingless.

GENERA AND SYNONYMES.

<i>Cymbocarpum</i> , <i>DC.</i>	<i>Anidrum</i> , <i>Neck.</i>	<i>Astomæa</i> , <i>Reichb.</i>	<i>Coriandrums</i> , <i>L.</i>
<i>Bifora</i> , <i>Hoffm.</i>	<i>Ormosciadium</i> , [<i>Boiss.</i>]	<i>Astoma</i> , <i>DC.</i>	<i>Apiastrum</i> , <i>Nutt.</i>
<i>Ecforis</i> , <i>Sp.</i>	<i>Schrenkia</i> , <i>Fisch.</i>	<i>Cryptodiseus</i> , <i>Schrk.</i>	<i>Seaphospermum</i> , <i>Edg.</i>
<i>Corion</i> , <i>Link.</i>		<i>Atrema</i> , <i>DC.</i>	<i>Actinocladus</i> , <i>E. M.</i>

GEOGRAPHICAL DISTRIBUTION.—The greatest number of this family is found in the temperate and colder regions of the northern hemisphere;

they are rare between the tropics, except on the lofty mountains, and on the sea shore.

PROPERTIES AND USES.—Although this is one of the most natural families, and all the genera of which it is composed bear a close resemblance to each other in their botanical characters, still they have not all the same properties, nor have they all the same action on the animal economy. We see this exhibited in the different species of Hemlock, Water Dropwort, and several others, compared with Anise, Caraway, Carrot, and Parsnip; the former are among the most virulent and subtle poisons, while the latter are either medicinal in their virtues, or furnish wholesome and nutritious vegetable diet. The cause of this anomaly is shown in the chemical composition of the family, which presents two very different principles; the one resinous, containing a great quantity of volatile essential oil, which is very odorous and aromatic; the other of an extractive nature, less odorous, and slightly bitter. It is to the presence of these two constituent principles, therefore, that the properties of this family are owing. They will be tonic, excitant, aromatic, and carminative, in such cases where the resin and volatile oil predominate, as is the case in Fennel, Anise, Coriander, Angelica, Cumin, and Caraway. This aromatic and stimulant principle resides principally in the seeds, but it also exists in the stems, such as those of Angelica, and Celery. It is from the aromatic plants of the Umbellifers that the concrete, gum-resinous juice is extracted, which is known under the names of Assafoetida, Galbanum, and Opopanax. If the aromatic principle is united with a considerable quantity of mucilage and saccharine matter, then the plants of this family become fit to be used for food, as is shown in the Carrot, Parsnip, Celery, and, in fact, all our cultivated vegetables which belong to the same order. But if, on the contrary, the prevailing part is extractive—if the aromatic principle is not predominant—they will then have very different properties, and become true narcotic poisons. It is worthy of observation that the aromatic principle is much more developed in those plants which grow naturally in dry and warm countries; whilst, on the contrary, those which grow in the shade, in humidity, or even in water, contain the extractive and narcotic principle which is so dangerous in its results, both to man and animals.

In treating of the properties and uses of the Umbellifers, we shall divide them into the following sections, classifying them according to their properties:—1. Aromatic and stimulant; 2. Acid aromatics; 3. Mucosaccharine and esculent; 4. Narcotic and poisonous; 5. Gum-resinous.

1. Aromatic and Stimulant.—As we have already said, the virtues of this section are due to the presence of a considerable quantity of essential oil, which has much of the nature of that furnished by the Composite and Labiate families. *Pimpinella anisum*, is the *Common Anise*, originally from Egypt and the Levant, but now cultivated all over Europe, for its seeds, which are a grateful, aromatic carminative, and said to have the property of increasing the secretion of milk. The seeds have a fragrant odour, and a sweet, warm, aromatic taste. The volatile oil exists in the oil-chambers of the seeds, and is obtained by distillation; but they also yield, from their inner substance, a fixed oil, which is obtained by expression, and is of a greenish colour. The volatile oil is very exciting, and is used as a substitute for the seeds. The seeds are sometimes used as condiment, to facilitate the

digestion of various vegetables, particularly those containing a great quantity of water. The seeds of *P. peregrina* have no smell, and, when first chewed, have scarcely any taste, but in a short time are very acrimonious, and excite a great heat in the fauces. *P. aromatica* has very much the same properties as anise, but is less aromatic, and rather more acrimonious. In all the species of *Fennel* the whole plant has an aromatic odour and taste, dependent on its volatile oil. The seed is used as one of the most grateful aromatics, and is extensively employed as a carminative, and as a corrector of less pleasant medicines, particularly rhubarb and senna; and it is esteemed for this purpose, from the absence of any highly excitant property. The leaves of *Common Fennel* (*Foeniculum vulgare*) are used in domestic economy as an ingredient in fish sauces; and the root has a sweet taste, with very little aromatic warmth, and is said to be pectoral and diuretic. Boerhaave considered it aperient, but it is now totally disregarded. The stalks of *F. dulce*, called *Sweet Fennel*, or *Finocchio*, are earthed up and blanched, like celery, when they are eaten with oil, vinegar, and pepper, as a cold salad, and are likewise put into soups. The Italians call the seeds *cose dolce*, and use them to flavour tarts, pastry, and a number of other dishes. They form their principal aromatic condiment. *F. piperitum* has a hot, biting taste, and is called by the Sicilians *Finocchio d'asino*, or *Asses' Finocchio*. *F. panmorium* is cultivated in India, under the name of *Panmuhooree*, and is used as an aromatic in food and in medicine.

Common Caraway, or *Carvi* (*Carum carvi*), may be found wild in Britain, where, having escaped from cultivation, it has become naturalized. It is extensively grown in some parts of Kent and Essex for its seeds, which are well known from their extensive use in confectionary, domestic economy, and medicine. The whole plant and root are aromatic, but the seeds particularly so. They have a pleasant, aromatic smell, and a sweetish, warm, spicy taste. They are generally employed medicinally, as a carminative, and an excitant of the digestive organs. It is said that the root, when improved by culture, resembles the parsnip, and is used for food by the inhabitants of the north of Europe. Similar in properties to the preceding are the seeds of *Cuminum cyminum*, or *Cumin*, a plant much cultivated in Malta and Sicily. In Germany the seeds are often mixed with the dough of bread, and it is said they are used in Holland to communicate their flavour to cheese. Those of *Lagoecium cuminoides* are applied to similar uses. *Coriander* (*Coriandrum sativum*) possesses the same virtues as the other aromatics already mentioned; and it is singular that the whole plant, in a fresh state, is extremely fetid when bruised, while the fruit becomes fragrant by drying, and the longer they are kept the more aromatic do they become. The seeds are used for various purposes, in confectionary they are incrustated with sugar, they communicate flavour to spirituous liquors, and, in the north of Europe, they are used in bread. The seeds of *Dill* (*Anethum graveolens*) have all the properties of the other aromatic seeds, and from them, distilled with water, the carminative draught known as *Dill water* was made, but it is now quite disregarded in medical practice.

There are some less aromatic and stimulant than those mentioned, and which, in former times, were regarded as diuretic and vulnerary. Of these *Helosciadium mnodiflorum* (*Water Parsnip*,) was found by Withering to be

an excellent cure in obstinate cutaneous eruptions. The plant is generally considered poisonous, but he found the expressed juice neither affected the head, stomach, nor the bowels. *Ægopodium podagraria*, called *Gout-weed* or *Herb Gerard*, was formerly used to assuage the pain of the gout and piles. *Common Samphire* (*Crithmum maritimum*) grows abundantly on some of the rocky cliffs of the British coast, and on the rocky sea shore. The whole plant is odorous, with a piquant, aromatic, and slightly saline taste. The entire plant, and its thick, fleshy leaves, make an old-fashioned and excellent pickle, with vinegar, which forms an excellent condiment, and is considered very diuretic. The cultivated *Chervil*, which is used in salads, is *Anthriscus cerefolium*. It has a strong, agreeable odour, especially when rubbed, and a pungent, slightly bitterish taste. It is said to be decostruent, diuretic, and emmenagogue, and has been recommended in consumption, scrofula, dropsy, cutaneous and scorbutic affections; but it is a very feeble remedy, and is more valuable as a salad-plant and pot-herb, than for any other purpose. *Sweet Chervil*, or *Sweet Cicely* (*Myrrhis odorata*), is one of the old medicinal plants, but now disused. In Germany it is still used in soups; and in the north of England the seeds were formerly employed in polishing, and perfuming oak floors and furniture. The seeds of *Ptychotis Ajowain* is everywhere cultivated in India, and is esteemed as an excellent remedy in flatulent colic. *P. coptica*, and *P. sylvestris*, are both used for the same purpose. The seeds of *Sison amomum*, or *Stone Parsley*, are aromatic and pungent, when dry and ripe; but in an early state they, like the whole herb, have a peculiar nauseous smell. The rays of the umbel of *Ammi visnaga* become so hard as to be used for toothpicks, and hence it is called in France *herbe aux cure-dents*. In Spain, when they have served this purpose, they are chewed, and thus are supposed to be of service in cleaning and fastening the gums. The leaves have a pleasant aromatic taste. The fruit of *Athamanta macedonica*, or *Spiguel*, are used as an ingredient in theriaca, and are esteemed as diuretic, emmenagogue, and carminative. In some parts of the East they use the plant to scent their clothes; the smell is very strong, and rather disagreeable to Europeans. *A. cretensis*, or *Candy Carrot*, possesses the same properties. *Silaus pratensis*, (*Pepper Saxifrage*), grows abundantly in some moist meadows and pastures in Britain, and has a disagreeable, fetid smell when bruised. It is supposed to give a bad flavour to milk and butter, but cattle do not eat it except accidentally, or in small quantities, sufficient only, perhaps, to have that effect, as in pastures it may be found partially cropped, though generally left almost untouched.

2. *Acid Aromatics*.—In this section the stimulating virtues are due to the presence of an essential oil and resin. *Angelica sylvestris* (*Wild Angelica*), has a bitter taste, and the herb, which has the same virtues as Garden Angelica, dyes a good yellow. Its root is much used by the Italians as a cure for itch. *Garden Angelica* is *Archangelica officinalis*, found wild in many parts of England, and cultivated in gardens for the sake of its stalks, which are candied with sugar, and when so prepared, are esteemed by many as a sweet-meat, and is used in desserts in order to stimulate the stomach. Formerly the stalks were blanched and used in salads in the same way as celery. The whole plant has a fragrant odour, and aromatic properties; but the root and fruit are used medicinally, and are esteemed

an excellent tonic, and stimulant aromatic. The root has a strong and fragrant smell, and the taste is at first sweetish, afterwards warm, aromatic, bitterish, and somewhat musky. Its constituents are a volatile oil, a volatile acid, called by Buchner *Angelieic acid*, a wax-like substance, a crystallizable sub-resin, a brittle, amorphous resin, a bitter principle, tannic acid, mallic acid, sugar, starch, albumen, pectic acid, fibrin, and various salts. The Laplanders esteem it highly as a condiment, and also as a medicine, and they chew the dried root as a substitute for tobacco. The fruit, commonly called "the seeds," has the same taste as the roots.

A. atropurpurea is a native of the United States. It has a strong odour, and a warm, aromatic taste. The juice of the fresh root is acrid, and said to be poisonous, but its acrimony is dissipated by drying. Its virtues are the same as those of the preceding. *A. Gmelini* is a native of Kamtschatka, and is used by the inhabitants in the place of parsley. *Imperatoria ostruthium* is a native of moist meadows and woods in Europe, and is found in several situations in Scotland. It is called *Great Masterwort*. The root is fleshy, tuberous, somewhat creeping, of an aromatic and acrid quality, with a pungent, biting taste, when eaten, causing a flow of saliva, followed by a glowing warmth, which remains long in the mouth, and hence it has been considered good in cases of rheumatic toothache. It was formerly considered a great counter poison, stomachic, corroborant, emmenagogue, diuretic, and diaphoretic, and was used with so much supposed success, that it became known by the name of *divinum remedium*. It is, however, merely a stimulant aromatic, inferior to Angelica. *Common Lovage* (*Levisticum officinale*) is grown in gardens as a salad-plant. It has a strong and peculiar odour, and abounds with a yellowish, gum-resinous juice. Its roots and fruits are aromatic, slightly acrid and stimulant, and used in expelling flatulencies, and exciting perspiration; and therefore chiefly used in hysterical disorders, and uterine obstructions. *Meum athamanticum*, or *Common Bald-money*, possesses in all its parts, and particularly in the root, the same aromatic and hot, biting flavour as Lovage, which it communicates to milk and butter, from the cows feeding upon its herbage in spring. A strong infusion of the herb is said to give cheese the taste and odour of the Swiss chapziegar. The fruits, as well as the roots, are considered carminative, and stomachic; and the latter is diuretic and expectorant.

The root of *Pimpinella magna*, or *Burnet Saxifrage*, is very acrid, burning the mouth like pepper, and its acrimony has occasioned it to be used as a cure for toothache, and to clear the skin from freckles. It is chewed to promote the secretion of saliva, and is used in gargles to dissolve viscid mucus in the throat. The seeds of *P. peregrina*, a native of the south of France, have no smell, and, when first chewed, have scarcely any taste, but in a short time become very acrid, and excite a great heat in the fauces. *Hieracium spondylium*, or *Common Cow Parsnip*, is found plentiful on the borders of fields in some parts of Britain. The whole plant is a wholesome and nourishing food for cattle, and is gathered in Sussex for fattening hogs, and hence called *Hoy-weed*. The seeds are strong-scented, and are accounted diuretic and stomachic. Gmelin says that the inhabitants of Kamtschatka, about the beginning of July, collect the footstalks of the root-leaves, and, after peeling of the rind, which is very acrid, dry them

separately in the sun, and then, tying them in bundles, lay them up carefully in the shade in bags; in this state they are covered with a yellow, saccharine efflorescence, tasting like liquorice, and this, being shaken off, is eaten as a great delicacy. The Russians distil an ardent spirit from the stalks thus prepared, by fermenting them in water with the fruit of *Vaccinium uliginosum*, which, Gmelin says, is more agreeable to the taste than spirits made from corn. A similar spirit is also made from *H. flavescens*, a native of Russia. The roots of *H. lanatum* and *H. cordatum* are used as substitutes for Angelica, and those of the former, when cooked, are eaten by the Cherook and Cree Indians of North America; but they have an acrid taste, and excite redness and inflammation when applied to the skin. The juice of *H. Sibericum*, or *Siberian Cow-Parsonip*, is very acrid, and, if rubbed on the skin of the hand, cause it and the arm to inflame and swell, so as to be quite painful. *Laserpitium glabrum*, called *Laserwort*, is acrid and aromatic, with somewhat of bitterness, and seems to merit a place among the aromatic stimulants, emmenagogues, and aperient sudorifics. It is used by the peasants of the Alps for their bodily ailments, and by the farriers for horses, in some countries. The root is the hottest part of the plant. The root of *L. siler* is extremely bitter, and might be useful in fevers and loss of appetite. An infusion of it in wine has been given with success in disorders of the stomach. It yields an aromatic and resinous oil, on being wounded; and being made into syrup, is recommended in disorders of the breast. The *Shepherd's Needle*, or *Venus' Comb* (*Scandix peecten veneris*), is found plentiful in cultivated lands in Britain, and is slightly aromatic and acrid. The Cossacks of the Jaik chew the seeds of *Cachrys odontalgica* for pain in the teeth, and to obtain relief by the copious salivation which follows their use. *Sanicula europæa*, or *Common Sanicle*, was formerly much celebrated as a vulnerary, and the whole plant is charged with a poisonous acrimony, particularly when grown in a moist soil. *S. marilandica*, called in the United States *Black Snake-root*, is there used as a domestic remedy in intermittent fevers; the root is the part employed. *Hydrocotyle vulgaris* (*Common Penny-wort*) was formerly considered diuretic and vulnerary. It is called in Norfolk *Flowlk-wort*, from a mistaken idea among the common people that it occasions the flukes in the liver of rotten sheep; hence it is also called in some places *sheep's bane*, because they imagine that it kills sheep which eat of it.

Eryngium campestre, or *Common Eryngo*, is a native of the whole continent of Europe, and is found in some places in Britain. The root has a slightly bitter and aromatic taste, which it almost entirely loses by boiling in water, and in this last state the country people on the continent use it as an aliment. The *Sea Holly*, *Sea Hulver*, or *Sea Holme* (*E. maritimum*), grows on the sea shore in many parts of Britain. According to Linnæus, the young flowering shoots of this plant, eaten like asparagus, are very nourishing. The leaves are sweetish, with a slight aromatic, warm pungency. The roots are supposed to have the same aphrodisiacal virtues as the orchis tribe. They are kept in shops candied, and have the reputation of being stimulating and restorative. They were first candied at Colchester, in Essex, about the beginning of the 17th century, by an apothecary, named Robert Buxton, and the same business is still continued in that town. *E. aquaticum* is a native of low, wet places in the United States,

where it is called *Button Snake-root*. The root has a bitter, pungent, aromatic taste, causing, when chewed, a flow of saliva. It is diaphoretic, expectorant, in large doses occasionally emetic, and is used by some physicians, in decoction, as a substitute for Seneka. The root of *Astrantia major* (*Master-wort*) is acrid and bitter, and not now used in medicine. *Thapsia silphium*, a native of North Africa, is supposed to be the plant which yielded the juice called *Silphium*, a medicine held in such high estimation among the ancients as to have imparted to the region where it grew, and which was in the vicinity of Cyrene, the appellation of Silphifera. The root of *T. asclepium* is about the thickness of a man's thumb; the bark is yellow and wrinkled; the inside white and abounding in a milky juice, which, along with the seeds, act as a drastic purgative, and may be used as a substitute for gamboge. The leaves of *Bupleurum rotundifolium*, and of *B. falcatum*, are bitter and astringent, and have been used as a vulnerary.

3. *Muco-Saccharine and Esculent*.—The roots and stalks of some of the plants of this family being subjected to cultivation, have, in consequence, become milder, and contain a great quantity of muco-saccharine matter. This we have exemplified in the Carrot, Parsnip, and Celery. The *Carrot* (*Daucus carota*), in its wild state, is found plentifully in Britain, by waysides, and in cultivated lands, and is known by the name of *bird's nest*, because its umbels of fruit, becoming incurved, form a hollow cup like a bird's nest. In its wild state the root is whitish, slender, hard, with an acrid, disagreeable taste, and a strong aromatic smell, and was formerly used as an aperient; but, when cultivated, it is reddish, thick, fleshy, with a pleasant odour, and a peculiar, sweet, mucilaginous taste. The constituents of the root are crystallizable and uncrystallizable sugar, a little starch, extractive, gluten, albumen, volatile oil, vegetable jelly or *pectin*, malic acid, saline matter, and a peculiar crystallizable, ruby-red, neuter principle, without odour or taste, called *Carolin*. This vegetable jelly, or *pectin*, so called from its peculiar property of gelatinizing, is considered by some as another form of gum, or mucilage, combined with vegetable acid. It exists, more or less, in all vegetables, and is abundant in all those fruits and roots from which jellies are prepared. It may be separated from the juice of fruit by means of alcohol; that precipitates it in the form of a jelly, which, being washed with weak alcohol and dried, yields a semi-transparent substance, bearing some resemblance to fish glue, or isinglass. This, if immersed in 100 parts of cold water, swells like bassorin, and ultimately forms a homogenous jelly, and, when acted on by a fixed alkali, or alkaline earthy base, is instantly converted into *pectic acid*. Carrot seeds are moderately exciting and diuretic, and have been employed in chronic nephritic complaints, and in dropsy. They are said to give relief in strangury from blisters. The root of the wild plant has the same properties as the seeds; but that of the cultivated variety has acquired much reputation as an external application to sloughing and cancerous ulcers, the fetor of which it is supposed to correct, while it sometimes changes the character of the diseased action; it is also useful in the ulcers which follow fevers. The root is generally prepared by scraping, by which it retains a portion of the active principle of the plant, which renders it somewhat stimulant. Boiled and mashed, it forms mild and emollient cataplasms. In the time of James I. we find that the ladies

wore carrot leaves instead of feathers, a hint which may be useful even in the present day, when elegance of design is so much cultivated. In winter an elegant chimney ornament is sometimes formed by cutting off a section from the thick end of a carrot, containing the bud, and placing it in a saucer, or any shallow vessel, with water. The young and delicate leaves unfold themselves, forming a radiated tuft of a very handsome appearance; and this, protected from dust and injury by a glass shade, will form a pleasing and agreeable object during the winter, when all outside is bleak and cheerless. The expressed juice of carrots, in consequence of the large proportion of sugar they contain, yields, after fermentation, and during the process of distillation, so large a quantity of alcohol as twelve gallons for every ton of carrots. *D. gummiferus* grows among rocks on the shores of the Mediterranean; the root of which yields a species of gum-resin, which is vulnerary, and is called *Bdellium siculum*.

The *Parsnip* (*Pastinaca sativa*) is found wild in meadows all over Europe. In Britain it is met with very generally on dry banks in a chalky soil. In its wild state the root is white, aromatic, mucilaginous, and sweet, with a degree of acrimony; and, particularly when old, they have been known to cause vertigo. Willis relates that a whole family fell into delirium from having eaten of the roots; and cattle never touch it in its wild state. But when cultivated, it is thick, fleshy, sweet, and mucilaginous. In domestic economy they are much used, and are a highly nutritious vegetable. In times of scarcity an excellent bread has been made from the roots, and they also furnish an excellent wine, resembling the Malmsey of Madeira and the Canaries. A spirit is also obtained from them in as great quantity as from carrots. All the domesticated animals feed on parsnips with avidity, and rapidly become fat on them. Cows fed with them yield butter of a fine yellow colour with a saffron tinge, and as rich as if produced from the richest pastures. Horses are very fond of them, and poultry also have been found to fatten well upon them. The leaves are also much relished by neat cattle, and, given to cows, impart as rich a colour to the butter as when they are fed on the roots; but they should never be given them when moist, as it has been found that a wet parsnip leave have caused inflammation of the udder. The composition of the parsnip root has been found to be 79.4 of water, 6.9 of starch and fibre, 6.1 of gum, 5.5 of sugar, and 2.1 of albumen. *Skirret* (*Sisum sisarum*) is a native of China, and is cultivated in the gardens of Europe for the sake of its roots, which are long, like fingers, united in clusters; by some they are much esteemed, being extremely sweet, but disliked by others for the same reason. Worledge called them the sweetest, whitest, and most pleasant of roots; and Maregrave extracted from them a fine white sugar, little inferior to that of the cane.

Parsley (*Petroselinum sativum*) is a native of the south of Europe and the East, and was introduced to this country from Sardinia in 1548. It contains in all its parts an essential oil, to which it owes both its flavour and medicinal properties. The herb contains a peculiar gelatinous substance, resembling pectic acid in appearance, which has been called *Apiin*. It is procured by boiling the herb in water, straining the liquor, and allowing it to cool; the apiin then forms a gelatinous mass, which requires only to be washed with cold water. The root of parsley has a pleasant smell, and a

sweetish, slightly aromatic taste, but loses these properties by long boiling and by the action of time. It is said to be aperient and diuretic, and is occasionally used in nephritic and dropsical complaints in connection with more active medicines. The juice of the fruit has been used as a substitute for quinia, in intermittents. It is extremely important not to mistake Parsley for Fool's Parsley (*Æthusa cynapium*), which has a great resemblance to it, particularly when the leaves only are present, as the latter is one of the most virulent vegetable poisons. The plant, which is so common in the ditches and marshes of this country, under the name of *Smallage* (*Apium graveolens*), is the wild form of *Celery*; but, by being subjected to cultivation, it loses its acrid nature, and becomes mild and sweet. In its natural state the plant is suspicious, being acrid, with a peculiar, rank, coarse taste and smell, and its root was reckoned by the ancients as one of "the five greater aperient roots." There is a variety of this in which the root acquires a swollen, turnip-like shape, and is called *Celeriac*, which is extensively used by the Germans, and preferred by them to *Celery*. Another plant was formerly used in this country, in the same way as *Celery* now is, under the name of *Alexanders* (*Smyrniolum olusatrum*). It is a native of Britain, and is found near the sea coast, but its cultivation is now almost entirely abandoned. It is called *Alexanders* from its Italian name "herba alexandrina," it being supposed to have been brought originally from Alexandria. The root of *S. perfoliatum* is aromatic, with a marked acrimony. The roots of *Bunium bulbocastanum*, a native of the continent of Europe, and those of *B. denudatum* (flexuosum), a native of Britain, are tuberous, and are known by the names of *Earth-nut*, *Pig-nut*, *Ar-nut*, *Yer-nut*, *Ground-nut*, and *Earth-chesnut*. They are black or chesnut-coloured on the outside, and white inside; aromatic, sweet, and mucilaginous, with a little acrimony. When boiled they are very sweet and delicious, and are supposed to yield great nourishment. In Holland, the Alps, and in some parts of England, they are used in soup, in broth, and also roasted under the embers, when they eat like roasted chesnuts. The tubers of *B. ferulaceum* are used in the same way in Greece; as are also *Oenanthe pimpinelloides* in this country. *Arracacha esculenta* is a native of Grenada, and produces large roots, with branches like a cow's horn in size and shape. They are of a yellow colour, varying to white and purple; are easily propagated by division, and are cooked and eaten in the same way as parsnips, but considered better, and easy of digestion. It is extensively cultivated in the temperate mountain regions about Santa Fé de Bagota. The roots of *Anesorrhiza capensis* and *Fœniculum capense* are aromatic, and used at the Cape of Good Hope as esculents. *Prangos pabularia* is a native of the temperate parts of the East Indies, about Imfal and Droz. It is employed in the form of hay, as winter fodder for cattle, sheep, and goats; but its seeds, when eaten by horses, are said to produce inflammation of the eyes, and temporary blindness. It has the property of fattening cattle very rapidly, and also of destroying the *Fasciola hepatica*, or *liver fluke*, which, in Britain, is so destructive to the life of sheep. Dr. Royle is of the opinion that it is one of the plants which yielded the *Silphium* of Alexander's historians.

4. **Narcotic and Poisonous.**—In this class some of the most deadly poisons of the vegetable kingdom are found; and among them the most noted and

virulent is *Hemlock* (*Conium maculatum*). It is a native all over Europe, and is not infrequent in Great Britain, growing in waste grounds, among rubbish, and on dunghills. It is easily distinguished from all other umbelliflowers by its spotted stem, by the dark and shiny green colour of the bottom leaves, and especially by their disagreeable smell when bruised, the whole plant exhaling, particularly during June and July, a fetid odour, compared by some to that of mice, by others to that of the urine of cats. Linnæus states that sheep eat the leaves, and horses, cows, and goats refuse them. Ray informs us that the thrush will feed upon the fruits even when corn is to be had. Narcotic effects are experienced by those who breathe for a long time air impregnated with the effluvium; and this narcotic power varies according to the climate and character of the weather, being most active in hot and dry seasons, and in warm countries. The Hemlock of Greece, Italy, and Spain, is said to be much more energetic than that of the north of Europe. In its medical action Hemlock is narcotic, without being decidedly stimulant or sedative to the circulation. When taken so as to affect the system, it produces more or less vertigo, dimness of vision, nausea, faintness, sensations of numbness, and general muscular debility. In larger doses, it occasions dilated pupils, difficulty of speech, delirium or stupor, tremors and paralysis, and ultimately convulsions, and even death. Sometimes it produces fatal effects through paralysis alone, without coma and convulsions. With this, as with other poisonous plants, there are many instances of death being occasioned by the reckless or ignorant use of the herb. Some years ago, two soldiers at Waltham Abbey collected herbs for boiling with bacon, which, when cooked, they and their comrades ate of the broth and then of the herbs and the bacon. Soon afterwards they were all seized with vertigo, were comatose, and two of them became convulsed and died in about three hours. It is supposed to be the narcotic used by the Athenians to destroy the life of condemned individuals, and by which Socrates and Phocion died. Judiciously administered as a medicine, it is said to be anodyne, soporific, antispasmodic, antaphrodisiac, deobstruent, and diuretic. It was highly recommended by Stœrek as a remedy in scirrhus and cancerous ulcers, but at present is only considered useful as a palliative in this complaint. In tumours of the breasts, and chronic enlargements of the liver; in scrofulous tumours and ulcers; in various diseases of the skin; in chronic rheumatism, and neuralgic affections; in excessive secretion of milk, and in several other diseases, it is occasionally employed with the effect of palliating or relieving the symptoms, or favourably modifying the action of remedies with which it is combined.

It appears that there are two volatile substances in Hemlock; one of them an oil, which comes over by simple distillation, and upon which the odour of the plant depends; and the other an alkaline principle, called *Conia*, which, as it exists in the plant, is so combined as not to be volatilizable; but which, when separated by one of the mineral alkalies, from its native combination, rises readily in distillation, and may thus be procured separate. In what state of combination it exists in the plant is not certainly known; but it is probably connected with an acid, as it is separated by the alkalies; this acid is called *Coniic acid*. *Conia* is in the form of a yellowish, oily liquid, lighter than water; of a strong and penetrating odour, like that of hemlock, yet not identical with it, and of a very

acid taste. It is readily soluble in alcohol, ether, the fixed and volatile oils, and slightly so in water. In its effects on the system it closely resembles hemlock, being a most energetic poison, one drop of it injected into the eye of a rabbit having killed the animal in nine minutes, and three drops killing a stout cat in a minute and a half, when similarly applied. The best method of relieving its poisonous effects is the speedy evacuation of the stomach.

Not less poisonous than the hemlock is the *Water Hemlock* or *Cowbane* (*Cicuta virosa*), which, fortunately, is not so common in this country, being only found in certain localities in England, but more frequently in Scotland. It inhabits the margins of rivers, lakes, pools, and ditches, and is one of the most virulent of the vegetable poisons. Many accidents have arisen from the careless use of this plant also. It is but a few months since two men, in the little village of West Boldon, near Sunderland, lost their lives by incautiously eating the root. One of the men had been in the habit of eating simple roots, and while he and his companion were at work, they came upon the roots of Water Hemlock, of which they ate, and, after losing their consciousness, they were found lying close to the ditch where they had been at work, paralyzed and speechless. They were removed in a cart to the village, and medical aid called in; but both expired shortly after they were got into a house, and their bodies blackened all over. In the pocket of one of them a piece of the root was found. Several instances are on record where children have eaten the root by mistake for parsnip. Linnæus states that its effects are fatal to cattle; and Withering relates that, early in spring, cows often eat it and are killed, but as the summer advances, and its scent becomes stronger, they carefully avoid it; that goats, however, devour it greedily with impunity, and that horses and sheep eat it with safety. It operates as an acid narcotic, producing inflammation of the stomach, together with symptoms which indicate cerebral disturbance, such as vertigo, intoxication, and convulsions. Infusion of galls is recommended as an antidote, but it should not be relied upon to the exclusion of emetics. When the plant causes vomiting, fatal effects are less likely to ensue. It is said to be less poisonous dried than fresh, and it has been inferred that the active principle is volatile; but the volatile oil obtained by distillation was found not to be poisonous, and, on the other hand, the alcoholic extract of the dried root operated as a violent poison upon animals. In studying the economy of the plant, we find that, towards the end of autumn, the root for the following summer is formed out of the lower part of the stalk; this is divided transversely into many large unequal cells, so that it becomes specifically lighter than water, and in winter, when the rivers and pools swell, it is buoyed up. The old root then rots, floats all the winter, and, in rivers, is frequently carried to great distances. In the spring the old root is washed away, and the new one, in coming near the soil, sends out many slender fibres, by which it is again fixed, grows, and flowers. *C. maculata*, or *American Water Hemlock*, is very nearly related to the preceding, and the same direful results are recorded of it as of the other.

On the banks of rivers and in watery places in Great Britain, there grows a plant from two to three feet high, with a furrowed stem, which branches near the top, bearing umbels of white flowers in the months of June and July. Its lower leaves are large and much divided, having foot-stalks

which sheathe the stem at their base. This is the *Hemlock Water Dropwort* (*Ænanthe crocata*), considered by Dr. Pulteney the most deadly of all the vegetable poisons that Great Britain produces. It is equally fatal to man and the inferior animals. The whole plant discharges, when wounded, an acrid, fetid, and poisonous, saffron-coloured milky juice, which is perhaps the best indication of its deleterious properties; but it is in the root where this juice most abounds. The root has a sweetish, not unpleasant taste, and is sometimes eaten by mistake for other roots, with the most dangerous results, not being sufficiently disagreeable in flavour to deter persons from eating them. Numerous are the instances of death being occasioned by eating the roots of this plant by mistake. The symptoms produced are such as attend irritation or inflammation of the stomach, united with great cerebral disturbance, indicated by giddiness, convulsions, and coma. Miller relates that a whole family were poisoned at Battersea by eating the roots; and in the "Philosophical Transactions" it is recorded that eight young lads died at Clonmel, in Ireland, by mistaking the roots for those of Water Parsnip. It is said that brood-mares sometimes eat them and are poisoned. Applied externally, the root produces redness and irritation of the skin, with an eruptive affection. *Æ. fistulosa*, or *Common Water Dropwort*, is less poisonous than the above. The whole plant has an unpleasant smell, a hot, nauseous taste, and on this account should be regarded with suspicion. *Æ. apifolia*, a native of Portugal, is very poisonous, but abounding in less orange-coloured juice than *Æ. crocata*. *Æ. peucedanifolia*, found in several parts of England, although not reckoned poisonous, must be used with caution. The roots taste like parsnips. The Hottentots make an intoxicating liquor from *Lichtensteinia pyrethriifolia*, which they call *Gli*. *Sium latifolium*, or *Broad-leaved Water Parsnip*, which inhabits ditches, rivers, and fens, has an acrid property, and is generally regarded as poisonous. *Fool's Parsley* (*Aethusa cynapium*) is also narcotic and poisonous, and is perhaps the most dangerous of the whole of the poisonous individuals of the family, from its great similarity to garden parsley, and from growing in cultivated grounds, and not unfrequently in kitchen gardens. But it is only in the absence of the flower that any mistake of this kind can arise, for, independently of the flower being very white, while those of the garden parsley are yellowish-green, they are also furnished with three long, pendulous bracts under each umbellule. *Anthriscus sylvestris* (*Wild Chervil*), and *Chærophylllum temulentum*, or *Rough Cow Parsley*, are to be regarded with suspicion, although the latter is eaten freely by domesticated cattle, with no inconvenient results.

5. **Gum-Resinous.**—The plant which yields Gum Ammoniac is *Dorema ammoniacum*, a native of the south of Persia and the north-west coast of the Hindoo Coosh mountains. It attains the height of six or seven feet, and, in the spring and early part of summer, abounds in a milky juice, which flows out on the slightest puncture. From the accounts of travellers it appears that, in the month of May, the plant is pierced in innumerable places, by a beetle, the juice exudes through the wounds, hardens on the stem, and, when quite dry, is collected by the natives. M. Fontaniér states that the juice exudes spontaneously, and that the harvest is about the middle of June; while Dr. Grant asserts that the drug is collected in Syghau like assafoetida, from the root of the plant. The gum-resin is sent

to Bushire, when it is transmitted to India. The drug is supposed to have been derived from the temple of Jupiter Ammon, in the Lybian desert, where the ammoniac of the ancients is said to have been collected; but David Don considered it a corruption of Armeniacum, originating in the circumstance that the gum-resin was formerly imported from Armenia. *Ammoniac* is either in the form of tears, or in masses. Its smell is peculiar, and stronger in the mass than in the tears. The taste is slightly sweetish, bitter, and somewhat acrid. When heated, it softens and becomes adhesive, but does not melt. In its medical properties ammoniac is stimulant and expectorant, in large doses cathartic, and, like many other stimulants, may be given so as occasionally to prove diaphoretic, diuretic, or emmenagogue.

Ferula communis, or *Giant Fennel*, is a native of the hills extending over the whole of the south of Europe. The plant abounds in a yellow fetid juice, which issues from the stem when wounded, and hardens on the surface of the wound. The dry dead stem is full of white pith, which easily takes fire, and therefore used by the Sicilians as tinder. In Apulia, where the plant grows in great abundance, it is grateful to buffaloes, which form the chief part of the subsistence of many farmers there. From *F. persica* a gummy juice exudes, which, when hardened, forms a variety of *Assafœtida*; but the plant from which that drug is obtained in greatest quantity is *F. assafœtida*, a native of Persia, Afghanistan, and is produced most abundantly in the mountainous parts of Khorassan and Laar. The root is perennial, fleshy, tapering, simple, or divided; a foot or more in length, about three inches thick at the top, of a dark-grey colour on the outside, white internally, and abounding in an excessively fetid, opaque, milky juice, which is said to differ in character according to the situation and soil in which it grows. The oldest plants are most productive, and those under four years old are not considered worth cutting. At the season when the leaves begin to fade, the earth is removed from about the top of the root, and the leaves and stem, being twisted off near their base, are thrown with other vegetable matters over the root, in order to protect it from the sun. After some time the summit of the root is cut off transversely, and the juice which exudes, being scraped off, another slice is removed in order to present a fresh surface for exudation. This process is repeated till the root ceases to afford juice, and perishes.

Assafœtida is a resinous substance, in irregular masses of a yellowish or reddish-brown colour externally, exhibiting, when broken, an irregular, whitish, somewhat shining surface, which soon becomes red on exposure, and ultimately passes into a dull yellowish-brown. The odour is like that of garlic, extremely fetid and tenacious; the taste bitter, acrid, and durable. It softens by heat without melting, and is difficult of pulverisation. It is inflammable, burning with a bright, lively flame. It yields all its virtues to alcohol, and forms a clear tincture, which becomes milky on the addition of water. According to the analysis of Pelletier, *assafœtida* contains 65 parts of resin, 19.44 of gum, 11.66 of bassorin, 3.60 of volatile oil, with traces of supermalate of lime. The odour of the gum-resin depends on the *volatile oil*, which may be procured by distillation with water or alcohol. It is lighter than water, colourless when first distilled, but becoming yellow with age; of an excessively offensive odour, and of a taste at first flat, but afterwards bitter and acrid. When long exposed to the air, it becomes slightly

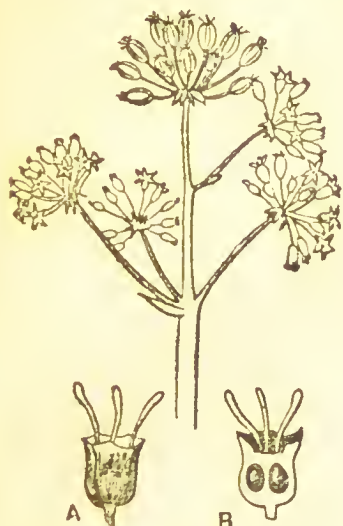
acid, and acquires a somewhat different odour. The effects of assafoetida on the human system are those of a moderate stimulant, powerful antispasmodic, efficient expectorant, and feeble laxative. It appears to have been known in the East from a very early period, and, notwithstanding its repulsive odour, it is even in the present day much used by the Persians and Asiatics as a condiment, and by them termed "food for the gods." The Norwegians use it with their native brandy as a cure for many complaints, and there are instances of people carrying it about their persons as a preventive of epileptic fits.

It is not certainly known what plant it is which yields the product called *Galbanum*. That the plant belongs to this family there is no manner of doubt, and it is even supposed that it is not one only, but several, which supply this drug. Some have referred the product to *Galbanum officinale*, a native of the eastern coast of Africa, from Nubia to the Cape of Good Hope. Others suppose it to be produced by *Ferula ferulago*, which inhabits the coasts of the Mediterranean, and is found in Transylvania and the Caucasus; and lastly, Dr. Lindley imagined it was obtained from an undescribed plant, which he called *Opoidia galbanifera*; but Dr. Pereira found that this substance was unlike Galbanum, or any other product of the Umbellifers. The drug is obtained by wounding the plant, when a cream-coloured juice exudes, which becomes hard on exposure to the air. The odour of Galbanum is strong and penetrating, but not like garlic, as that of *Sagapenum* and *Assafoetida*. It has an acrid, bitter, and warmish taste. In its medical properties it is stimulant, expectorant, and antispasmodic, and may be considered as intermediate in power between ammoniac and assafoetida. It enters principally into the composition of some plasters to indolent swellings, with the view of promoting resolution and suppuration.

Sagapenum is another of the gum-resins yielded by some individual of this family, but the identical plant is not known with any degree of certainty. Some suppose it to be *Ferula persica*, while others think it is derived from *F. Szowitziana*. This substance is in irregular masses, slightly translucent, of a brownish-yellow, olive, or reddish-yellow colour externally, paler internally, brittle, and of a consistence somewhat resembling that of wax. It has a garlic odour, less disagreeable than that of assafoetida, and a hot, nauseous, bitter taste. It softens and becomes tenacious by the heat of the hand; it is inflammable, burning with a white flame and much smoke, and leaving a light, spongy charcoal. Pure alcohol and water partially dissolve it. It is a moderate stimulant, similar to assafoetida in its properties, but much inferior, and usually considered as holding a middle station between that gum-resin and galbanum. From *Opopanax chironium* the drug *Opopanax* is obtained. The plant is a native of the Levant, and grows wild in the south of France, Italy, and Greece. When the base of the stem is wounded a juice exudes, which, when dried in the sun, furnishes the *Opopanax* of commerce. Its odour is strong, peculiar, and unpleasant, and its taste bitter and acrid. It was formerly held in estimation as beneficial in hypochondriasis, hysteria, asthma, and as an emmenagogue; but it is now regarded as a medium of very feeble powers. From some species of *Mulinum*, and *Bolax Gillesii*, and *B. elebaria*, a gum-resin similar to *Opopanax* is obtained, which is employed by the native Chilian practitioners.

ORDER CI.—ARALIACEÆ—THE IVY FAMILY.

TREES, or shrubs, rarely herbs; sometimes climbing, and adhering by root-formed fibres to other substances, as in the Ivy. *Leaves* alternate, rarely opposite, simple or compound, with foot-stalks widened at the base, and sheathing the stem, and without leaflets at the base. *Flowers* hermaphrodite, or unisexual. *Calyx* adherent to the ovary; the limb entire or toothed. *Corolla* with five to ten petals, rarely more, valvate in æstivation, and alternate with the teeth of the calyx. *Stamens* equal in number to the petals, rarely double the number, inserted with them on the ovary. *Ovary*, Fig. A, inferior, surmounted by a more or less thick disk, and with two to fifteen one-ovuled cells. *Styles*, Fig. B, equal in number to the cells, sometimes united together. *Stigmas* simple. *Fruit* a berry, fleshy, preserving on the summit the traces of the calyx, with two to fifteen one-seeded cells. *Seeds* angular, erect, with a hard skin. *Embryo* very small, inverted, having a superior radicle, which is twice the length of the seed-lobes; *albumen* fleshy.

Fig. 126. *Aralia racemosa*.

GENERA AND SYNONYMES.

<i>Adoxa</i> , L.	<i>Gastonia</i> , Comm.	<i>Hedera</i> , L.
<i>Panax</i> , L.	<i>Polyscias</i> , Forst.	<i>Gynaptea</i> , Bl.
<i>Aureliana</i> , Catesb.	<i>Trevesia</i> , Vis.	<i>Paratropia</i> , DC.
<i>Araliastrum</i> , Vaill.	<i>Brassaia</i> , Endl.	<i>Heptapleurum</i> , Gärt.
<i>Electronia</i> , Lour.	<i>Toricellia</i> , DC.	<i>Arthrophyllum</i> , Bl.
<i>Cussonia</i> , Th.	<i>Aralia</i> , L.	<i>Botryodendrum</i> , Endl.
<i>Maralia</i> , Thouars.	<i>Schefflera</i> , Forst.	<i>Miquelia</i> , Meisn.
<i>Gilibertia</i> , R. & P.	<i>Dimorphanthus</i> , Miq.	<i>Touroulia</i> , Aubl.
<i>Wangenheimia</i> , Dietr.	<i>Sciadophyllum</i> , P. Br.	<i>Robinsonia</i> , Schreb.
<i>Ginnania</i> , Dietr.	<i>Actinophyllum</i> , R. & P.	

GEOGRAPHICAL DISTRIBUTION.—In the tropics of the whole world, and bordering on them; also in the temperate regions of both hemispheres, but particularly in North America, where they are plentiful. In northern Europe and Asia they are rare.

PROPERTIES AND USES.—The flowers of *Adoxa moschatellina*, a native of Britain, have the scent of musk, and formerly its roots were reckoned medicinal. The root of *Panax quinquefolium* furnishes the drug so highly esteemed by the Chinese, under the name of *Ginseng*. The plant grows naturally in the Northern and Western States of North America, and in Chinese Tartary. This enters into the composition of almost every medicine used by the Chinese, by whom it is regarded as a cure for every disease. A

great deal of the root is annually exported from North America to China, which, of late years, has considerably reduced the value of it. The root has a feeble odour, and a sweet, slightly aromatic taste, somewhat analogous to that of liquorice root; and it is said to be rich in gum and starch, with a little resin and essential oil. As a medicine it is little more than a demulcent, and its extraordinary virtues have no other existence than in the minds of the Chinese, who called it "the pure spirit of the earth." *P. fruticosus* and *P. cochleatus*, both natives of the Moluccas, are used by the native practitioners of India as aromatic medicines; they yield a resin similar to opoponax, and their herbaceous parts smell like parsley. The berries of *P. anisum* have the scent of Anise.

The root of *Aralia nudicaulis*, a native of the United States and Canada, was formerly sold for Sarsaparilla, and hence it is called *False Sarsaparilla*, and *Wild Sarsaparilla*. In America it is called *Small Spikenard*. The Cree Indians use the root as a remedy against the venereal disease, and it is used both in domestic practice and by practitioners in America for the same purpose, and as a remedy for rheumatic and cutaneous affections. The root of *A. racemosa*, or *American Spikenard*, is highly esteemed as a medicine, having the same properties as the preceding. Pursh says, the berries of *A. spinosa*, called in America *Angelica Tree*, when infused in spirits or wine, are remarkable for relieving rheumatic pains, and a similar tincture is employed in Virginia with advantage in violent cholice; its pungency has also been found to relieve toothache. An infusion of the fresh bark is emetic and cathartic. It is used in chronic rheumatism and cutaneous eruptions, and in some parts of the southern states it has been employed in syphilis. It is from the pith of *A. papyrifera* that the Chinese *Rice Paper* is made. The young shoots of *Dimorphanthus edulis* are used in China as a vegetable, and the plant is regarded as possessing diaphoretic properties. The Japanese use the root in winter in the same way as we do that of scorzonera; it has a bitter, aromatic flavour.

The *Common Ivy* (*Hedera helix*) is well known as an evergreen creeper, forming an ornamental covering to old buildings, and a verdant clothing to what would otherwise be bare and unsightly. The fresh leaves have a balsamic odour, especially when rubbed, and a bitterish, harsh, and unpleasant taste. They are used for dressing issues, and, in the form of decoction, have been recommended in sanious ulcers, and cutaneous eruptions, particularly tetter and the itch; and, when bruised, they are applied with effect to corns. The berries, which have an acidulous, resinous, somewhat pungent taste, are said to be purgative, and even emetic, and to contain a peculiar principle called *pederin*. It is very bitter, and appears to be closely allied to quinia. An acid is also obtained, called *pederic acid*. The berries are eagerly eaten by wood-pigeons, blackbirds, and thrushes. From the old trunks a resinous substance exudes, through incisions in the bark, which has been employed in medicine, under the name of *ivy gum*, as a stimulant and emmenagogue; and placed in the cavities of carious teeth, it is said to relieve toothache. The wood is soft and porous, and is used by leather-cutters to whet their knives on; and it is also made into issue peas. *H. umbellifera*, a native of Amboyna, is said to furnish wood which smells like lavender and rosemary; and *H. terebinthacea* yields, in Ceylon, a resinous substance, which smells like turpentine.

ORDER CII.—CAPRIFOLIACEÆ—WOODBINES.

SHRUBS, which are sometimes climbing, rarely herbs or trees. *Leaves*



Fig. 127. *Abelia uniflora*.

opposite, sometimes connate, simple, rarely pinnate, and seldom with two small leaflets at the base. *Flowers* hermaphrodite, sometimes sterile, disposed in corymbs, in heads, or sort of whorls. *Calyx* with five, rarely four lobes, adhering to the ovary. *Corolla* monopetalous, with five, rarely four lobes, regular or two-lipped, inserted in the summit of the tube of the calyx. *Stamens* five, rarely four, inserted in the calyx, and adnate with the corolla at the base, and alternating with its lobes. *Ovary* inferior, with three to five cells, of which two are furnished with sterile ovules, as in *Abelia*, and with three to five sessile stigmas, or three to five styles, which are either distinct or united. *Fruit* a berry, crowned with the limb of the calyx, with from three to five one-seeded or oligospermous cells. *Seeds* inverted, solitary, twin or

numerous in the cells, but sometimes many of them are abortive. *Embryo* in the centre of a fleshy albumen, with a superior radicle and two ovate-oblong seed-lobes.

TRIBE 1. *Sambuceæ*.—Corolla monopetalous, regular, and rotate. Petals connected a little at the base. Style wanting. Stigmas three, sessile.

GENERA AND SYNONYMES.

<i>Sambucus</i> , T.	„ <i>Solenotus</i> , DC.	<i>Opulus</i> , T.
<i>Phyteuma</i> , Lour	<i>Lentago</i> , DC.	? <i>Valentiana</i> , Raf.
<i>Viburnum</i> , L.	<i>Tinus</i> , T.	? <i>Carpatus</i> , Raf.

TRIBE 2. *Lonicereæ*.—Corolla tubular, usually irregular. Style thread-like, crowned by three distinct concrete stigmas.

GENERA AND SYNONYMES.

<i>Linnæa</i> , Gron.	<i>Abelia</i> , R. Br.	<i>Symphoricarpus</i> ,	„ <i>Symphoria</i> , Pers.
<i>Obolaria</i> , Lieg.	<i>Veselia</i> , Martens.	[<i>Dill.</i>]	<i>Anisanthus</i> , W.

Leycesteria, Wall.	Alsenosmia, Cunn.	„ Cobaea, Neck.	Isica, Man.
Diervilla, T.	Caprifolium, Juss.	Nintooa, Sic.	Triosteum, L.
Calysphyrum,	Periclymenum, T.	Chamæcerasus, T.	Chlamydocarpus,
[Bng.]	Lonicera, Desf.	Cuphautha, DC.	[Jaub.]
Weigela, Th.	Xylosteum, Juss.	Isika, Ad.	

GEOGRAPHICAL DISTRIBUTION.—Found in the temperate and colder regions of the northern hemisphere. They are met with most abundantly in Northern India and America, and very few are found south of the tropics.

PROPERTIES AND USES.—Two principles are found in this family; the one astringent, which exists particularly in the leaves of the Honeysuckles; the other, much more abundant and more active, is more or less purgative in its action. Thus the berries of Honeysuckle and Elder are laxative, while the bark of the young branches of the latter are violently purgative.

Sambucæ.—*Dwarf Elder* (*Sambucus ebulus*) has a most disagreeable odour, being nauseous, fetid, and noxious. Its qualities are violently purgative, sometimes emetic; yet a rob of the fruit is said to have been taken with safety to the extent of an ounce. The foliage is not eaten by cattle, nor will moles come where the leaves of this, or those of any of the species, are laid. They drive away mice from granaries, and the Silesians strow them where their pigs lie, under the belief that they prevent diseases to which they are liable. *Common Elder* (*S. nigra*), or *Bountry* and *Boortree*, as it is called in Scotland, is found plentifully in Britain, and is even cultivated in gardens and shrubberies, both for ornament as well as for its flowers and berries. With the berries a rob is made, which is a safe and excellent domestic remedy for colds, coughs, and sore throats, and is slightly purgative. *Elder Wine* is also made from them, and they are said to enter into the composition of spurious port wine, and to be used as an adulteration of the genuine article. The expressed juice, inspissated to the consistence of rob, has enjoyed some reputation as a remedy in rheumatic, gouty, eruptive, and syphilitic affections. The flowers have a sweet odour, and yield a volatile oil by distillation, which, on cooling, assumes a buttery consistence. Water distilled from them contains an appreciable portion of ammonia. They are gently excitant and sudorific, but are seldom used except externally in the form of poultices, fomentation, or ointment. They are used in home-made wines, to give the Frontignac flavour. An infusion of the leaves proves fatal to various insects which thrive on blighted or delicate plants, and therefore some gardeners use a strong infusion of them to preserve delicate flowers from minute caterpillars. The young leaf-buds are strongly purgative, and act with so much violence as to be considered dangerous. The inner bark is violently cathartic, and has been employed in dropsy and various other chronic diseases. It contains valeric acid. *S. canadensis* possesses properties very similar to those of common Elder.

Laurustinus (*Viburnum Tinus*) is a native of northern Africa and southern Europe. It is one of our most ornamental evergreen shrubs, flowering as it does during the winter months, and yielding an agreeable sweet perfume which attracts the bees. The berries are very hot, and inflame the mouth violently, like those of Mezereon, and they are also said to be violently purgative, but some kinds of birds eat them greedily. The *Wayfaring Tree* (*Viburnum lantana*) is found plentifully in the hedgerows and coppices of

England. Its bark serves to make bird-lime, but of inferior quality to that obtained from the bark of the holly. The fruit of some are catable—as those of *V. edulis* and *V. oxycoccus*, which are used as a substitute for cranberries. The *Gueldres Rose* is a variety of *V. opulus*, a native of Britain, but differs from the species in having the flowers all sterile and formed into a ball; hence called *Snowball Tree*.

Lonicereæ.—The leaves of *Linnæa borealis* are regarded by the Swedes as diuretic and diaphoretic. The *Honeysuckles* (*Caprifolium*) are well known for their elegant and fragrant flowers. The berries of *Lonicera cærulea* are a favourite food of the Kamtchadales. The roots of *Triosteum perfoliatum*, or *Fever-wort*, are used in North America as an emetic for ippecacuanha; and they act also as a mild cathartic. The dried and roasted berries have been used as a substitute for coffee. It was first brought into notice by a Dr. Tinkar, and hence it has been called *Tinkar's root*.



ORDER CIII.—RUBIACEÆ.—MADDER FAMILY.

TREES, shrubs, or herbs. *Leaves* opposite, simple, with leaflets at their base, quite entire.



Fig. 128. *Oxyanthus tubiflorus*.

Flowers generally hermaphrodite, rarely unisexual by abortion. *Calyx* tubular, adherent to the ovary, entire, or with four or six lobes, of which one is large and coloured, as in *Mussaenda*. *Corolla* monopetalous, inserted in the summit of the tube of the calyx, with four to six divisions. *Stamens* four to six, alternating with the lobes of the corolla, and more or less adnate to its tube. *Ovary* inferior, with two or more cells, rarely one-celled by abortion. *Style* simple. *Stigmas* equal in number to the cells of the ovary. *Fruit* either a capsule or a berry, two or many-celled, and the cells one or many-seeded. *Seeds* with large fleshy or horny albumen, containing a straight or slightly-curved embryo, with a cylindrical radicle turned towards the hilum, and with leaty seed-lobes.

SUB-CLASS II.—CINCHONÆ.

Ovules numerous in the cells. Cells of the fruit many-seeded.

TRIBE 1. *Gardeniæ*.—Fruit unopening, fleshy, usually two-celled, rarely one-celled by abortion. Seeds not winged. Trees or shrubs, with opposite leaves and interpetiolar stipules.

SUB-TRIBE 1. *GARDENIDÆ*.—Flowers distinct, not joined together in a head.

GENERA AND SYNONYMES.

Burchellia, <i>R. Br.</i>	Cassupa, <i>H. B.</i>	Leucocodon, <i>Gard.</i>	Chomelia, <i>L.</i>
Bubalina, <i>Ehren.</i>	Gynopachys, <i>Bl.</i>	Discospermum, <i>Dalz.</i>	Webera, <i>Schreb.</i>
Amaioua, <i>Aub.</i>	Tocoyena, <i>Aub.</i>	Megacarpus, <i>Hchst.</i>	Zamaria, <i>Raf.</i>
Hexactina, <i>W.</i>	Ucriana, <i>W.</i>	Rhodostoma, <i>Scheid.</i>	Tarcna, <i>Gärt.</i>
Ehrenbergia, <i>Sp.</i>	Pasoqueria, <i>Aub.</i>	Randia, <i>Houst.</i>	Petesia, <i>Bart.</i>
Cordia, <i>Rich.</i>	Cyrtanthus, <i>Schröb.</i>	Oxyceros, <i>Lour.</i>	Coccocypselum, [Swar
Alibertia, <i>Rich.</i>	Kyrtanthus, <i>Gn.</i>	Gardenia, <i>Gärt.</i>	Sicelium, <i>P. Br.</i>
Genipella, <i>L.C.R.</i>	Solena, <i>W.</i>	Ceriscus, <i>Gärt.</i>	Tontanea, <i>Aub.</i>
Scepeothamnus, <i>Ch.</i>	Posoria, <i>Raf.</i>	Enclina, <i>DC.</i>	Bellardia, <i>Schr.</i>
Thileodoxa, <i>Ch.</i>	Oxyanthus, <i>DC.</i>	Hyptianthera, <i>W&A</i>	Condalia, <i>R. & P.</i>
Melanopsidium, [Cels.	Conosiphon, <i>Pöpp.</i>	Griffithia, <i>W. & A.</i>	Fernelia, <i>Comm.</i>
Viviania, <i>Coll.</i>	Sphinctanthus, [Benth.	Chapelieria, <i>Rich.</i>	Petunga, <i>DC.</i>
Billiottia, <i>DC.</i>	Genipa, <i>Plum.</i>	Heinsia, <i>DC.</i>	Higginsia, <i>Bl.</i>
Gardeniola, <i>Ch.</i>	Lasiostoma, <i>Benth.</i>	Menestoria, <i>DC.</i>	Spicillaria, <i>Rich.</i>
Acranthera, <i>Arn.</i>	Gardenia, <i>Ell.</i>	Helospora, <i>Jack.</i>	Higginsia, <i>Pers.</i>
Alberta, <i>E. Mey.</i>	Kumbaya, <i>Endl.</i>	Hippotis, <i>R. & P.</i>	O'Higginsia, <i>R&P</i>
Gonyanera, <i>Krthls.</i>	Bertuchia, <i>Den.</i>	Bertiera, <i>Aub.</i>	Neurocalyx, <i>Hook.</i>
Mussaenda, <i>L.</i>	Piringa, <i>Juss.</i>	Zaluzania, <i>Com.</i>	Argostemma, <i>Wall.</i>
Neurocarpa, <i>R. [Br.</i>	Thuinbergia, <i>Mnt.</i>	Mycetia, <i>Reinw.</i>	Pomangium, <i>Rein</i>
Landia, <i>Comm.</i>	Sahlbergia, <i>Neck.</i>	Pouhettia, <i>Rich.</i>	Hoffmania, <i>Sw.</i>
Caanthe, <i>DC.</i>	Bergkias, <i>Sonn.</i>	Stylacoryne, <i>DC.</i>	Catesbaea, <i>L.</i>
Kutchubaea, <i>Fisch.</i>	Chaquepinia, <i>Sal.</i>	Wahlenbergia, <i>Bl.</i>	Aspidanthera, <i>Benth.</i>
	Rothmannia, <i>Th.</i>	Cupia, <i>DC.</i>	
		Cupi, <i>Rheede.</i>	

SUB-TRIBE 2. SARCOCEPHALIDÆ.—Flowers sessile, collected into a head upon the receptacle; the fruit combined together into one.

GENERA AND SYNONYMES.

Sarcocephalus, <i>Afz.</i>	„ Zuccarinia, <i>Bl.</i>	„ Canephora, <i>Juss.</i>
Cephalina, <i>Thonn.</i>	Lucianea, <i>DC.</i>	Breonia, <i>A. Rich.</i>

TRIBE 2. EUCINCHONIDÆ.—Fruit a capsule, two-celled; cells many-seeded. Seeds winged. Trees or shrubs with interpetiolar stipules.

SUB-TRIBE 1. NAUCLEIDÆ.—Flowers in heads, sessile upon a globose receptacle.

GENERA AND SYNONYMES.

Stephegyne, <i>Krthls.</i>	„ Platanocarpum, [Endl.	„ Nauclearia, <i>DC.</i>	Uncaria, <i>Schreb.</i>
Platanocarpum, [Hook. f.	Mitragyne, <i>Korth.</i>	Bancalus, <i>Rumph.</i>	Agylophora, <i>Neck.</i>
Nauclea, <i>L.</i>	Mamboya, <i>Blane.</i>	Acerodryon, <i>Sp.</i>	Ourouparia, <i>Aub.</i>
		Pentacoryna, <i>DC.</i>	Adina, <i>Sal.</i>

SUB-TRIBE 2. CINCHONIDÆ.—Flowers with footstalks, never seated on a globose receptacle.

GENERA AND SYNONYMES.

Sulipa, <i>Blane.</i>	Cosmibuena, <i>R. & P.</i>	Ladenbergia, <i>Ktsch.</i>	Luculia, <i>Succet.</i>
Crossopteryx, <i>Fenzl.</i>	Buena, <i>Pohl.</i>	Cinchona, <i>L.</i>	Hymenodictyon, [Wall.
Stevensia, <i>Poit.</i>	Chrysoxylon, <i>Wed.</i>	Kinkina, <i>Ad.</i>	Kurria, <i>Hchst.</i>
Coutarea, <i>Aub.</i>	Pimentella, <i>Wed.</i>	Quinquina, <i>Endl.</i>	Captosapelta, <i>Krth.</i>
Ferdinandusa, <i>Phl.</i>	Cascarilla, <i>Wed.</i>	Cascarilla, <i>Endl.</i>	Exostemma, <i>L.C.R.</i>
Ferdinandia, <i>Phl.</i>	Gomphosia, <i>Wed.</i>	Ramijia, <i>DC.</i>	Pitonia, <i>DC.</i>
Hillia, <i>Jacq.</i>	Shoulleinia, <i>Ktsch.</i>	Macrocnemum, [Fcl.	Brachyanthe-
Ferciria, <i>Vand.</i>	Voigtia, <i>Ktsch.</i>	Lasionema, <i>Don.</i>	[mum, <i>DC.</i>
Hymenopogon, <i>Wall.</i>	Rustia, <i>Ktsch.</i>		

Alseis, <i>Schott.</i>	Conotrichia, <i>Rich</i>	,, Houstonia, <i>Andr.</i>	Pinekneya, <i>L.C.R.</i>
Danaia, <i>Comm.</i>	Lygistum, <i>P. Br.</i>	Christima, <i>Raf.</i>	Pinknea, <i>Pers.</i>
Manettia, <i>Mutis.</i>	Guagnebina <i>Fl Fl</i>	Æginetia, <i>Cav.</i>	Calycophyllum, <i>DC</i>
Nacibea, <i>Aub.</i>	Bouvardia, <i>Sal.</i>		

TRIBE 3. *Hedyotidæ*.—Fruit a two-celled capsule, opening at the cells, and rather membranous and unopening; cells many-seeded. Seeds not winged. Shrubs or herbs with opposite leaves, and interpetiolar stipules.

SUB-TRIBE 1. *RONDELETIDÆ*.—Stipules twin on both sides, combined or distinct, but neither sheathed nor divided into many bristles. Trees or shrubs.

GENERA AND SYNONYMES.

Condaminea, <i>DC.</i>	Choristes, <i>Benth.</i>	Wendlandia, <i>Bart.</i>	Virecta, <i>L. f.</i>
Macrocnemum <i>P Br</i>	Rondeletia, <i>Bl.</i>	Rhombospora, <i>Krts.</i>	Ptychodea, <i>W.</i>
Chimarrhis, <i>Jacq.</i>	Petesia, <i>P. Br.</i>	Lerchea, <i>L.</i>	Pentas, <i>Benth.</i>
Lindenia, <i>Bnth.</i>	Lightfootia <i>Schr</i>	Codaria, <i>L.</i>	Virecta, <i>DC.</i>
Schreibersia, <i>Pohl.</i>	Willdenowia, <i>Gm</i>	Xanthophytum,	Lipostoma, <i>Don.</i>
Augusta, <i>Pohl.</i>	Arachnimorpha,	[<i>Bl.</i>	Ophiorrhiza, <i>L.</i>
Augustea, <i>DC.</i>	[<i>Desv.</i>	Pentaspermum,	Leptopetalum <i>Hook</i>
Portlandia, <i>P. Br.</i>	Selenocera, <i>Zipp.</i>	[<i>Bnth.</i>	Spiradielis, <i>Bl</i>
Bikkia, <i>Reinw.</i>	Bathysa, <i>Presl.</i>	Greenia, <i>W. & A.</i>	Tula, <i>Ad.</i>
Cormigonus, <i>Raf.</i>	Hindsia, <i>Benth.</i>	Carphalea, <i>Juss.</i>	Campylobotrys,
Isidorea, <i>Rich.</i>	Adenosacme, <i>Wall.</i>	Sipanea, <i>Aub.</i>	[<i>Decna.</i>
Spallanzania, <i>DC.</i>	Myecetia, <i>Reinw.</i>		

SUB-TRIBE 2. *HEDYOTIDÆ*.—Stipules formed into a sheath on each side, adnate to the petioles, and ending in many bristles at the apex. Herbaceous, or suffrutescent plants.

GENERA AND SYNONYMES.

Polypremum, <i>L.</i>	Listeria, <i>Neck.</i>	Pentodon, <i>Hchst.</i>	Houstonia, <i>L.</i>
Karamyschewia, <i>F.</i>	Ereicotis, <i>DC.</i>	Hedyotis, <i>Lam.</i>	Poiretia, <i>Gm.</i>
[<i>& M.</i>	Scleromitron,	Diplophragma,	Amphiotis, <i>DC.</i>
Lucya, <i>DC.</i>	[<i>W. & A.</i>	[<i>W. & A.</i>	Edrissa, <i>Raf.</i>
Dunalia, <i>Sp.</i>	Hedyotis, <i>Roxb.</i>	Micrandria, <i>W & A</i>	Pentotis, <i>Torr.</i>
Rhachicallis, <i>DC.</i>	Euhedyotis <i>W & A</i>	Dimetia, <i>W. & A.</i>	Rogiera, <i>Planchon.</i>
Kadua, <i>Ch. & Schl.</i>	Otomeria, <i>Benth.</i>	Anotis, <i>DC.</i>	Gonotheca, <i>Bl.</i>
Kohautia, <i>Ch. & Schl.</i>	Theyodes, <i>Rich.</i>	Didymotoce, <i>Endl</i>	Dentella, <i>Forst.</i>
Oldenlandia, <i>L.</i>	Vignoldia, <i>Rich.</i>	Ambloma, <i>Endl.</i>	Lippaya, <i>Endl.</i>
Gerontogia <i>Ch & S</i>	Coptophyllum <i>Krth</i>	Eurhaphe, <i>Endl.</i>	Bertuchia, <i>Den.</i>
Hedyotis, <i>Gärt.</i>	Dictyospora, <i>Reinw</i>	Panetos, <i>Raf.</i>	

TRIBE 4. *Isertieæ*.—Fruit drupaceous, composed of from two to six many-seeded, bony nuts (pyrenæ). Albumen fleshy. Shrubs or herbs, with opposite leaves, and the stipules interpetiolar.

GENERA AND SYNONYMES.

Metabolus, <i>Bl.</i>	Gonzalea, <i>Pers.</i>	Bruinsmannia, <i>Miq</i>
Sclerococcus, <i>Bart.</i>	Gonzalagunia, <i>R. & P.</i>	Isertia, <i>Schreb.</i>
Anthocephalus, <i>L. C. R.</i>	Lygistoides, <i>DC.</i>	Posanthus, <i>Raf.</i>
Cephalidum, <i>A. R.</i>	Rhyssoearpus, <i>Endl.</i>	

TRIBE 5. *Hamelieæ*.—Fruit a many-celled berry, and the cells many-seeded. Albumen fleshy. Shrubs or trees, with the leaves opposite or in whorls, and the stipules interpetiolar.

GENERA AND SYNONYMES.

Polyphragmon, <i>Dsf</i>	Duhamelia, <i>Pers</i>	Axanthos, <i>Bl.</i>	Sabicea, <i>Aub.</i>
Patima, <i>Aub.</i>	Tangaraea, <i>Ad.</i>	Maschalanthe, <i>Bl.</i>	Schwenkfeldia <i>W</i>
Brignola, <i>DC.</i>	Lonicera, <i>Pl.</i>	Cymaloncina, <i>Prl</i>	Paiva, <i>Fl. Fl.</i>
Schradera, <i>Vahl.</i>	Axanthopsis, <i>Krtls.</i>	Holostyla, <i>DC.</i>	Tepesia, <i>Gärt. f.</i>
Fuchsia, <i>Sw.</i>	Paravinia, <i>Krtls.</i>	Stylocoryna, <i>Lab.</i>	Evosmia, <i>H. & B.</i>
Urceolaria, <i>W.</i>	Urophyllum, <i>Jack.</i>	Schizostigma, <i>Arn.</i>	Evosma, <i>W.</i>
Hamelia, <i>Jacq.</i>	Wallichia, <i>Roxb.</i>		

SUB-CLASS II.—COFFEEÆ.

Ovules solitary, or rarely twin in the cells. Cells of the fruit one, or very rarely two-seeded.

TRIBE 6. Cordiereæ.—Fruit a many-celled berry; cells one-seeded. Shrubs with opposite leaves, and broad interpetiolar stipules.

GENERA.

Tricalysia, *A. Rich.*Cordia, *A. Rich.*

TRIBE 7. Guettardeæ.—Fruit a drupe, composed of two to five one-seeded pyrenæ, or bony nuts. Seeds cylindrical, usually erect, Albumen fleshy. Shrubs or small trees, usually with opposite leaves, rarely three in a whorl, and with interpetiolar stipules.

SUB-TRIBE 1. MORINIDÆ.—Flowers and fruit joined together into a head.

GENUS AND SYNONYMES.

Lachnostoma <i>Krtls</i>	„ Roioe, <i>Plum.</i>	„ Phylliræastrum,	Chrysorhiza, <i>DC.</i>
Morinda, <i>Vaill.</i>	Padavara, <i>Rhcedc</i>	[<i>DC.</i>	Sphærophora, <i>Bl.</i>

SUB-TRIBE 2. EUGUETTARDIDÆ.—Flowers distinct, not joined together into a head.

GENERA AND SYNONYMES.

Myrmecodia, <i>Jacq.</i>	Cadamba, <i>Don.</i>	Crusea, <i>A. Rich.</i>	Erithalis, <i>P. Br.</i>
Hydnophytum <i>Jacq</i>	Halesia, <i>P. Br.</i>	Chione, <i>DC.</i>	Herrera, <i>Ad.</i>
Hypobathrum, <i>Bl.</i>	Matthiola, <i>Pl.</i>	Timonius, <i>Rmph.</i>	Retiniphyllum,
Nertera, <i>Banks.</i>	Edechi, <i>Löffl.</i>	Bobea, <i>Gaud.</i>	[<i>H. & B.</i>
Nerteria, <i>Sm.</i>	Dicrobotryon, <i>W.</i>	Bobæa, <i>A. Rich.</i>	Nonatelia, <i>Aub.</i>
Gomezia, <i>Mut.</i>	Laugeria, <i>Jacq.</i>	Burneya, <i>Ch. & S.</i>	Oribasia, <i>Schröb.</i>
Erythrodanum,	Sardinia, <i>Fl. Fl.</i>	Erithalis, <i>Forst.</i>	Gyrochodes, <i>Bl.</i>
[<i>Thouars.</i>	Ullobus, <i>DC.</i>	Eupyrena, <i>W. & A.</i>	Cælospermum, <i>Bl.</i>
Mitchella, <i>L.</i>	Viviania, <i>Raf.</i>	Pyrostria, <i>Roxb.</i>	Ancylanthus, <i>Desf.</i>
Chamædaphne,	Terebraria, <i>Scss.</i>	Santia, <i>W. & A.</i>	Hylacium, <i>Palis.</i>
[<i>Mit.</i>	Rytigynia, <i>Bl.</i>	Psathyra, <i>Comm.</i>	Phallaria, <i>Schum.</i>
Baumannia, <i>DC.</i>	Malanea, <i>Aub</i>	Chicoinea, <i>Com.</i>	Cuviera, <i>DC.</i>
Mephitidia, <i>Rnw.</i>	Cunninghamia,	Psathura, <i>Poir.</i>	Dondisia, <i>DC.</i>
Lasianthus, <i>Jacq.</i>	[<i>Schreb.</i>	Hamiltonia, <i>Roxb.</i>	Stigmanthus, <i>Lowr.</i>
Vangueria, <i>Com.</i>	Antirrhoa, <i>Comm.</i>	Spermadictyon,	Stigmanthus,
Vanguiera, <i>Pers.</i>	Neuropora, <i>Com.</i>	[<i>Roxb.</i>	[<i>R. & S.</i>
Vavanga, <i>Rohr.</i>	Stenostomum, <i>Grt.f</i>	Leptodermis, <i>Wall.</i>	Strumpfia, <i>Jacq.</i>
Meyenia, <i>Lk.</i>	Sturmia, <i>Grt.</i>	Myonima, <i>Com.</i>	Strumpfia, <i>Pers.</i>
Craterispermum,	Stenostemum,	Pyrostria, <i>Com.</i>	Epithinia, <i>Jacq.</i>
[<i>Benth.</i>	[<i>Juss.</i>	Oetavia, <i>DC.</i>	Commianthus, <i>Benth</i>
Guettarda, <i>Vent.</i>	Sacconia, <i>Endl.</i>	Lithosanthos, <i>Bl.</i>	

TRIBE 8. *Pæderieæ*.—Fruit two-celled, unopening, hardly fleshy, the rind easily separated from the seeds or carpels. Carpels compressed, one-seeded, hanging from a thread-like axis. Albumen fleshy. Climbing shrubs, with opposite leaves, and interpetiolar stipules.

GENERA AND SYNONYMES.

<i>Lygodysodea</i> , R. & P.	<i>Lecontea</i> , A. Rich.	„ <i>Hondbessen</i> , Ad.
<i>Disodea</i> , Pers.	<i>Pæderia</i> , L.	<i>Reussia</i> , Dennst.

TRIBE 9. *Psychotrieæ*.—Fruit a two-celled berry, containing two one-seeded bony nuts (pyrenæ), which are flat in the inside, and usually marked by a furrow on the outside; rarely only containing one nut from abortion. Albumen horny. Trees or shrubs, with opposite leaves. Stipules interpetiolar, two on each side, combined or distinct.

SUB-TRIBE 1. *COFFEIDÆ*.—Flowers distinct, not joined together.

GENERA AND SYNONYMES.

<i>Cleisocratera</i> , Krt.	<i>Chiococca</i> , P. Br.	<i>Grumilea</i> , Gärt.	<i>Suteria</i> , DC.
<i>Amaracarpus</i> , Bl.	<i>Margaris</i> , DC.	<i>Rytidea</i> , DC.	<i>Condonocalyx</i> , Mrs.
<i>Damnacanthus</i> Grt f	<i>Descliea</i> , Fl. Mex.	<i>Macrocalyx</i> , Miers.	<i>Galiniera</i> , Del.
<i>Marquisia</i> , A. Rich.	<i>Saldinia</i> , A. R.	<i>Farama</i> , A. Rich.	<i>Feretia</i> , Del.
<i>Diplospora</i> , DC.	<i>Scolosanthus</i> , Vhl.	<i>Farmarea</i> , Witt.	<i>Rudgea</i> , Sal.
<i>Mitriostigma</i> , Hch.	<i>Antacanthus</i> ,	<i>Tetramerium</i> DC	<i>Antherura</i> , Lour.
<i>Canthium</i> , L.	[L. C. R.	<i>Potima</i> , Pers.	<i>Mapouria</i> , A. Rich.
<i>Psydrax</i> , Gärt	<i>Chomelia</i> , Jacq.	<i>Darluca</i> , Raf.	<i>Simira</i> , Aub.
<i>Pleurogaster</i> , DC	<i>Baconia</i> , DC.	<i>Antoniana</i> , Tuss.	<i>Ronabea</i> , Aub.
<i>Krausia</i> , Harv.	<i>Verulamia</i> , DC.	<i>Strempelia</i> , A. Rich.	<i>Viscoides</i> , Jacq.
<i>Psilostoma</i> , Kl.	<i>Ixora</i> , L.	<i>Renellia</i> , Krth.	<i>Psychotrya</i> , L.
<i>Plectronia</i> , L.	<i>Pavetta</i> , L.	<i>Tribrachya</i> , Krth.	<i>Psychotrophum</i> ,
<i>Mitrastigma</i> , Hrv	<i>Pavate</i> , Ray	<i>Pachysanthus</i> , Prt.	[P. Br.
<i>Nescidia</i> , A. Rich.	<i>Crinita</i> , Hoult	<i>Encopea</i> , Presl.	<i>Myrtiphyllum</i> ,
<i>Siderodendron</i> Schr	<i>Saprosma</i> , Bl.	<i>Cremaspora</i> , Bnth.	[P. Br.
<i>Eumachia</i> , DC.	<i>Coussarea</i> , Aub.	<i>Kraussia</i> , E. Mey.	<i>Palieourca</i> , Aub.
<i>Declieuxia</i> , H.B.K.	<i>Billardiera</i> , Vhl.	<i>Coffea</i> , L.	<i>Galvania</i> , Vand.
<i>Psyllocarpus</i> , Phl	<i>Frölichia</i> , Vhl.	<i>Hornia</i> , DC.	<i>Stephanium</i> , Schr
<i>Tertrea</i> , DC.	<i>Pecheya</i> , Scop.	<i>Panerasia</i> , DC.	<i>Colladonia</i> , Sp.
<i>Schiedea</i> , A. R.	<i>Polyosus</i> , Lour.	<i>Straussia</i> , DC.	<i>Chasalia</i> , Com.

SUB-TRIBE 2. *CEPHALÆLIDÆ*.—Flowers joined together in heads, and furnished with a fringe behind them.

GENERA AND SYNONYMES.

<i>Suteria</i> , DC.	<i>Eurothia</i> , Neek.	<i>Ipecacuanha</i> , Arruda.
<i>Salzmannia</i> , DC.	<i>Prosecephaleium</i> , Krthls.	<i>Tapogomea</i> , Juss.
<i>Patabea</i> , Aub.	<i>Cephaelis</i> , Swartz.	<i>Evca</i> , Juss.
<i>Carapichea</i> , Aub.	<i>Callicocca</i> , Schreb.	<i>Geophila</i> , Don.

TRIBE 10. *Spermacocææ*.—Fruit dry or slightly fleshy, usually composed of two one-seeded carpels.

SUB-TRIBE 1. *CEPHALANTHIDÆ*.—Flowers and fruit sessile, and formed into a dense head, seated on a globose receptacle. Fruit divisable into two parts. Shrubs.

GENUS AND SYNONYME.

<i>Cephalanthus</i> , L.
<i>Platanoccephalus</i> , Vaill.

SUB-TRIBE 2. SPERMACOCIDÆ.—Flowers distinct. Fruit dry, usually divisible into two parts, and sometimes into three or four parts. Usually herbs, rarely shrubs.

GENERA AND SYNONYMES.

Democritea, <i>DC.</i>	Hexasepalum, <i>Bart.</i>	Mitracarpum, <i>Zucc.</i>	Gaillionia, <i>A. Rich.</i>
Ocotodon, <i>Thonn.</i>	Diodia, <i>L.</i>	Schizangium, <i>Br.</i>	Ptychostigma, <i>Hch.</i>
Borreria, <i>Mey.</i>	Dasycephala, <i>DC.</i>	Staurospermum,	Otiophora, <i>Zucc.</i>
Bigelovia, <i>Sp.</i>	Triodon, <i>DC.</i>	[<i>Thonn.</i>	Knoxia, <i>L.</i>
Chlorophytum,	Crusea, <i>Ch. & S.</i>	Perama, <i>Aub.</i>	Machaonia, <i>H. & B.</i>
[<i>Pohl.</i>	Richardsonia, <i>Knth</i>	Mattuschkea,	Jaubertia, <i>Guill.</i>
Gruhlmannia,	Richardia, <i>L.</i>	[<i>Schreb.</i>	Emmeorhiza, <i>Pohl.</i>
[<i>Neck.</i>	Schiedea, <i>Brth.</i>	Staelia, <i>Cham.</i>	Endlichera, <i>Pr.</i>
Spermacoe, <i>L.</i>	Hypodematum,	Tessiera, <i>DC.</i>	Deppea, <i>Ch. & S.</i>
Covelia, <i>Neck.</i>	[<i>Rich.</i>	Psyllocarpus, <i>Mart.</i>	Cruckshanksia, <i>H & A</i>
Chenocarpus, <i>Nck</i>	Pentanisia, <i>Harv.</i>	Diodois, <i>Pohl.</i>	Rotheria, <i>Meyen.</i>
Tardavel, <i>Ad.</i>	Diotocarpus, <i>Hch.</i>		

SUB-TRIBE 3. PUTORIDÆ.—Fruit rather fleshy, not divisible. Shrubs and herbs.

GENERA AND SYNONYMES.

Serissa, <i>Comm.</i>	Ernodea, <i>Swartz.</i>	Sarissus, <i>Gärt</i>	Placoma, <i>Pers.</i>
Dysoda, <i>Lour.</i>	Cuncea, <i>Hamill.</i>	Scyphiphora, <i>Gärt. f</i>	Bartlingia, <i>Rehb.</i>
Buchozia, <i>Herit.</i>	Hydrophylax, <i>L. f.</i>	Plocama, <i>Ait.</i>	Putoria, <i>Pers.</i>
Wiegmannia, <i>Meyen</i>			

TRIBE 11. Anthospermeæ.—Flowers sometimes dioecious. Corolla rotate. Styles two, separate to the base, ending each in an elongated feathery stigma. Fruit constantly composed of two unopening one-seeded carpels at maturity, which are easily separated. Albumen fleshy. Herbs or undershrubs, with leaves opposite or in whorls. Stipules small, one to three toothed, rather adnate to both sides of the petioles.

GENERA AND SYNONYMES.

Coprosma, <i>Forst.</i>	Bupleuroides,	Ambraria, <i>Cruse.</i>	Tournefortia,
Leptostigma, <i>Arn</i>	[<i>Boerh.</i>	Nenax, <i>Gärt.</i>	[<i>Ponted.</i>
Phyllis, <i>L.</i>	Galopina, <i>Th.</i>	Anthospermum, <i>L.</i>	Ambraria, <i>Heist.</i>
Nobula, <i>Ad.</i>	Oxyspermum, <i>E.</i>		Dysodidendron.
	[<i>& Z.</i>		

TRIBE 12. Stellatæ.—Flowers hermaphrodite, rarely unisexual. Corolla rotate or funnel-shaped; lobes valvate in æstivation. Styles two, distinct from the base, or more or less joined together. Stigmas capitate. Fruit constantly of two unopening one-seeded carpels. Seed hardly distinct from the calyx and pericarp. Albumen horny. Sometimes sub-shrubs, but usually herbs. Leaves opposite, bearing buds in the axils, having one, two, or three leaf-like stipules on each side, forming whorls along with them. The leaves are only to be distinguished from the stipules by being furnished with axillary buds.

GENERA AND SYNONYMES.

Sherardia, <i>L.</i>	Microphysa, <i>Schlk.</i>	Crucianella, <i>L.</i>	Rubia, <i>T.</i>
Dillenia, <i>Heist.</i>	Karamyschewia,	Rubiola, <i>Mon.</i>	Galium, <i>L.</i>
Asperula, <i>L.</i>	[<i>Fisch.</i>	Laxmannia, <i>Gml.</i>	Aspera, <i>Mon.</i>

„ Eyselia, Neck.	Cruciata, T.	Cucularia, Bxb.	Valantia, T.
Aparine, T.	Callipeltis, Stev.	Vaillantia, DC.	Mericalpæa, Boiss.

TRIBE 13. Operculareæ.—Fruit one-celled, one-seeded, joined together laterally into a head, and at length opening by two valves at the apex. Herbs or sub-shrubs, with opposite leaves. Stipules twins on each side, distinct or concrete.

GENERA AND SYNONYMES.

Pomax, Sol.
Opercularia, A. Rich.
Rubioides, Sol.
Cryptospermum, Young.

DOUBTFUL GENERA.

Sommeria, Schl.	Morelia, A. Rich.	Aidia, Lour.	Myrioneuron, R.Br
Anisomeris, Prt.	Jackia, Wall.	Sickingia, W.	Pleotheca, Wall.
Psilobium, Jack.	Zuccarinia, Sp.	Stipularia, Palis.	Egeria, Neraud.
Platyerium, Brt.	Himatanthus, W.	Benzonia, Schm.	Meretricia, Neraud.
Lecananthus, Jack.			

GEOGRAPHICAL DISTRIBUTION.—The majority are found between the tropics, or in the regions approximating them, and there they are more abundant than any other order of the vegetable kingdom. The Stellatæ are confined to the northern regions of both hemispheres, and to high elevations on the mountains of both Chili, Peru, and Australia.

PROPERTIES AND USES.—This family is remarkable for the similarity of the virtues which exist in the plants composing it. Thus the bark of the most part of the ligneous species contain an astringent and bitter principle, extremely abundant in the different species of Cinchona, but which exists also in other genera, although in a less degree. Thus the bark of species of Exostemma, of Portlandia hexandra, of Macronemum corymbosum, and many other exotics belonging to the same family, are in many countries of South America substituted for the true species of cinchona. By the analysis of Pelletier and Caventou, it was found that in the Peruvian Bark the astringent taste was owing to a particular acid called Kinic acid, while the bitterness was attributable to the presence of two new principles called quinine and cinchonine. The same astringent taste is met with in the Common Madder and in the Wild Madder, and some other native plants. But in no other plant does it acquire such intensity as in Uncaria gambir, the extract of which is known by the name of Gum Kino; but in this the astringency depends on tannin and gallic acid, of which almost the whole substance is composed. The root of many of this family furnishes a colouring principle, such as the red found in Madder. Many genera possesses an emetic property in their roots, as Cephaelis ipecacuanha. But the fine flavour and aroma of Coffee is not found in the same degree in the seeds of any other plant of the family, while at the same time there are some which have a considerable resemblance to them, as is the case in Psychotria herbacea, and also in those of common Goose-grass, or Cleavers, growing so abundantly in the hedges of this country.

Gardeniæ.—*Burchellia capensis* is a small tree, a native of the Cape of Good Hope, where it acquires the height of twelve or fourteen feet, and one

or two feet in diameter. The wood is very hard and close, and is generally used by the colonists for agricultural implements, under the name of *Büffelhorn*. *Mussænda Landia*, a native of the Mauritius, is there called *Quinquina indigène*, and is used in the cure of fevers as a substitute for Peruvian Bark. *Genipa oblongifolia* is a tree twenty feet high, a native of Peru, and produces fruit the size of a peach, the seeds and pulp of which are used by the Indians to dye their face and hands of a permanent black colour. The fruit of *G. marianæ*, a similar tree growing in Surinam and Cayenne, is about the size of a large orange, and is eatable, with a grateful and agreeable flavour; as is also that of *G. esculenta*, a native of Cochin China, but its fruit is not larger than a cherry. The fruit of *G. americana*, called *Genipap*, is also as large as an orange, of a greenish-white colour, with a dark-violet juice and a delicious vinous pulp. It is a native of the Caribbee islands, but is now cultivated in Guiana and Brazil for the sake of its fruit, which is much esteemed by the inhabitants. The Gardenias, which are the type of this tribe, and now so generally cultivated as decorative plants, have commended themselves to popular taste by their great beauty and delightful fragrance; and among these, the *Cape Jasmine* (*Gardenia florida*) and the smaller *G. radicans* are the best known. They are both natives of Japan, and the fruit of the former, which is about the size of a pigeon's egg and orange coloured, is used in China and Japan for dyeing coarse cloths and silks of a yellow colour, and is sold in the shops for this purpose; when eaten, they are considered by some cathartic and anthelmintic. Near Faconie, in Japan, it is used by the principal people only, for making hedges round their dwellings. From wounds made in the bark of *G. arborea* and *G. gummifera*, both natives of India, a beautiful yellow resin exudes, similar to gum elemi. The wood of *G. Thunbergii*, called *Büffels-ball* at the Cape of Good Hope, is very hard, heavy, and strong, and was used by the natives for making clubs, and now by the colonists for agricultural implements, axles, yokes, and fellies. It is a small shrub eight or ten feet high, and a foot in diameter in the stem. *G. Rothmannia* is larger, attaining the height, in some places, of twenty feet. Its wood is used for axle-trees and poles of waggons. Both of these last are cultivated in our stoves, and are highly ornamental and fragrant. *Randia latifolia* has been called *Indigo-berry*, because the pulp of its fruit stains paper and cloth of a fast blue colour. It is a native of the West India islands. In the East Indies *R. dumetorum* is used for hedges. The fruit seems to have a narcotic property, for when bruised and thrown into ponds where fish are, they are soon intoxicated, and seen floating. In consequence of this property, fishermen often have recourse to this mode of obtaining the fish, as they are not at all injured by the effects of the intoxication. From *Catesbæa spinosa*, *China Bark* is obtained. The fruit of *Sarcocephalus esculentus* are eatable, and from their size and appearance are called "peaches" by the natives of Sierra Leone.

Cinchonæ.—As a shade tree, there is perhaps none more highly valued in India than *Nauclea cadamba*, which grows so plentifully about Calcutta, and is there called *Kudumba*. It is highly ornamental, as well as useful for the shade it affords, and generally acquires a height of from thirty to forty feet. Another species of the same genus, very plentiful all over India, is *N. parvifolia*; it furnishes a close-grained chesnut coloured wood, exten-

sively used for various purposes, and, so long as it is kept dry, is very durable, but when exposed to wet it soon rots. Of the same character is the wood of *N. cordifolia*, which, though very much paler in colour, is still very beautiful and close-grained, resembling box-wood, but lighter. It also requires to be kept dry, and for furniture it answers exceedingly well, being light and durable. From *Uncaria gambir*, the Malayan drug *Gambier* is obtained. This important article was formerly called *Terra japonica* in Europe. The Malays use it with betel and areca, chewing it after the same manner as Kuth or Catechu in India. The young roots and leaves are sliced and bruised in water for some hours, until a feculum is deposited; this is inspissated in the sun to a proper consistence, and cast in moulds of a circular form. It is extensively used in Europe for tanning leather, calico printing, dyeing; and as an astringent, applicable to the same purposes as the official catechu. The Malays mix it with lime, and apply it externally to cuts, burns, and boils. It is a very powerful astringent, and its principal use is in tanning leather, in which one pound goes as far as seven or eight pounds of oak bark; 200 grains of the best, or dark kinds, contain 109 of tannin, and other kinds 97. Nees von Esenbeck found it to consist of from 36 to 40 per cent. of tannic acid, and a peculiar principle, gum, or gummy extractive, a deposit like the cinchonic red, and two and a half per cent. of lignin. The peculiar principle is called *Catechuin*, or *Catechuic Acid*. This, when perfectly pure, is snow-white, of a silky appearance, crystallizable in fine needles; unalterable, if dry, in the air; fusible by heat; very slightly soluble in cold water, with which it softens and swells up; soluble in boiling water, which deposits it on cooling; and soluble also in alcohol and ether; and it reddens litmus paper.

We now come to the consideration of those plants which furnish what are, *par excellence*, called "barks," and which occupy such an important position in the *materia medica*. *Peruvian or Jesuits' Bark* has been known in Europe since the year 1640, when it was introduced from Peru to Spain, by the Countess Cinchon, wife of the Count Cinchon, Don Geronimo Fernandez de Cabrera Bobadella y Mendoza, viceroy of Lima. This lady, being by the use of the bark cured of severe intermittent fevers when in Peru, brought some of it home with her, and having distributed it, it became known by the name of *Pulvis Comitissa*. Some years afterwards, its virtues attracted the notice of the Jesuit missionaries, and by them supplies of the bark were sent to the members of their order in Spain, by whom it was distributed for use in Italy, France, and Germany; and from this circumstance it derived the names of *Jesuits' Bark*, *Pulvis jesuiticus*, and *Pulvis patrum*. For more than a century after the bark became known, it was supposed to be the produce of one kind of tree only, and the supplies of it were all obtained from Loxa and the neighbouring provinces. This tree was discovered by La Condamine, one of the French academicians, who was sent to South America to make observations relative to the figure of the earth, and soon afterwards it was by Linnæus named *Cinchona officinalis*, in honour of the Countess Cinchon, who had introduced the bark to Europe. But in course of time, naturalists who visited South America discovered a vast number of trees whose bark furnished the same properties as the original Peruvian bark, and botanists were at last compelled to distribute them into distinct genera and species. Among these genera Cin-

chona is that which embraces the true Peruvian barks containing the true alkaloids, in quinia and cinchonia.

The genuine cinchona trees are confined exclusively to South America, where they are widely diffused, extending from the 19° of south latitude, considerably south of La Paz, in Bolivia, to the mountains of St. Martha, or to the vicinity of Caraccas on the northern coast, in about the 10° of north latitude. In this range they follow the circuitous course of the mountains, and for the most part occupy the eastern slope of the second range of the Cordilleras. Those which yield the bark of commerce, grow at various elevations on the Andes, seldom less than 4000 feet above the level of the sea; and require a temperature considerably lower than that which usually prevails in tropical countries. Before the subject was fully investigated, it was believed that the different varieties of bark, were yielded by three species of *Cinchona*. The *yellow bark* was thought to be the produce of *C. cordifolia*; the *pale bark* of *C. lancifolia*; and the *red bark* of *C. oblongifolia*. These opinions, however, have long ago been laid aside, as it is known that the valuable barks bearing those titles are not the product of the species to which they were formerly ascribed. Humboldt states that the virtues reside in the barks of those species of *Cinchona* alone which have hairy and woolly blossoms. Of late years the study of the subject has received close attention, and the genus has been very fully investigated by several eminent and competent botanists, among whom M. Weddell has perhaps been the most successful; and the result of their researches we shall endeavour to embody in the following account of the bark-producing species.

The tree which produces *Calisaya Bark* is *Cinchona calisaya*, Fig. 129,



Fig. 129 *Cinchona Calisaya*.

a large tree growing on the declivities of the Andes, at the height of six or seven thousand feet above the level of the sea, in the hottest valleys of Bolivia, and the most southern part of Peru. It is very lofty, having a trunk often two feet or more in diameter, but in consequence of the great consumption and the wasteful gathering of the bark, the largest trees have almost, if not entirely, disappeared, and

have been succeeded by a scrubby undergrowth, which, from want of protection, does not attain a greater height than twelve feet, with a slender stem, erect branches, and a bark strongly adherent to the wood. *Calisaya* is the most valuable of the YELLOW BARKS, and is of two varieties, the *quilled Calisaya*, called by the Spanish Americans *Calisaya arrollada*, and the *flat Calisaya*, called *Calisaya plancha*. The first of these is in the form of quills, from the thickness of a finger to two or three inches in diameter. The epidermis yields a dark-red powder, which has none of the properties of the bark, and it is therefore desirable to get rid of it before the bark is powdered, as the medicine is thus obtained of greater strength. The external part of the proper bark is more bitter and astringent, and consequently stronger in medicinal power than the internal, probably from the longer exposure of the latter to the action of air and moisture. The second variety is obtained from the large branches and trunk, and is in very large, flat pieces, two to three lines thick. It is generally destitute of the epidermis, which falls off from its want of adhesiveness to the proper bark. Though weaker than the proper bark of the preceding variety, it is usually, in equal weight, more valuable, because free from the useless epidermis. Although the great part of this variety of bark is obtained from *C. calisaya*, yet Weddell found that a portion was also got from another species, which he named *C. Boliviana*. It is supposed that this is the very bitter bark which the Jesuit missionaries sent to Spain under the name of *Quinquina*, before even the discovery of the Loxa bark. It has a very strong, bitter taste, with comparatively but little astringency; a fine brownish-yellow, or somewhat orange colour, which is still brighter in the powder, and contains a large proportion of quinia and very little cinchonia. The salts of quinia and lime are so abundant in its composition, that a strong infusion of it instantly precipitates a solution of sulphate of soda. Its constituents, as analysed by Thiel, are, in the flat bark, 2·3 per cent. of quinia, 0·08 of cinchonia. Michaelis found 3·7 per cent. of quinia in the flat, and 2·0 in the quilled, but no cinchonia in either. Van Santen obtained from the flat 2·0 of quinia, and little or no cinchonia; and Wittstock procured on an average 3·0 per cent. of sulphate of quinia, and 0·12 of cinchonia. The trade in *Calisaya* bark is carried on at La Paz, and it is shipped for various ports on the Pacific coast at Arica.

Loxa Bark is obtained from *C. Condaminea*, a small tree, about eighteen feet high, and a foot in the diameter of the stem. It grows in the neighbourhood of Loxa, and near Guaneabamba and Agavaca, in Peru. *C. lucumæfolia*, which also grows in the neighbourhood of Loxa, is supposed to contribute a variety known under that name. This is included under the name of PALE BARKS, of which there are several commercial varieties, obtained from different sources, and differing in their properties; but the most highly esteemed of these is the Loxa bark, the finest specimens of which are called *Loxa Crown*, and *Crown bark*, from the supposition that it is that which was formerly selected with so much care for the use of the King of Spain and the royal family. It is distinguished by several varieties—1. *Picked Crown Bark*, which consists of the finest, thinnest, and longest quills. 2. *Silvery Crown Bark*, somewhat larger in size, and characterised by a whitish, silvery appearance of the epidermis, caused by lichens adhering to it. 3. *Leopard Crown Bark*, so named from its speckled appearance, caused

by whitish lichens alternating with the dark-brown epidermis. Loxa bark contains about 0·48 of cinchonina, and 0·06 of quinia; and one pound yields from a drachm and a half to two drachms of sulphate of cinchonina. It was the Loxa bark which was first introduced to Europe by the Countess Cinchon. There are other varieties of pale barks, the most important of which is *Lima*, or *Huanuco Bark*, the production of which is ascribed to *C. micrantha*. This is a large tree, forty feet high, growing in the mountains near Chicoplaya, Monzou, Puebla de San Antonio, and at Cachero. This was introduced about the year 1779, after the discovery of the cinchona trees in central Peru. The first name originated from the circumstance that the bark was exported originally from Lima, and the second was derived from the name of the city in the neighbourhood of which the trees were found. The inner layers of this variety are usually soft and friable, and the colour of the powder is a fine cinnamon brown. The odour of the bark is like that of clay, and in this respect different from all other varieties. The taste is at first acidulous, astringent, and slightly aromatic, and ultimately bitter and adhesive. The proportion of Cinchonina contained in Huanuco Bark is 1·72 per cent.; of quinia, 0·29 per cent.

Among the Pale Barks there is one called *Jean Bark*, or *Ash Bark*, supposed by Von Bergen to be produced by *C. ovata*, which grows in close groves, in warm situations, at the foot of the Andes, near Pozuzo, and Panao, about ten leagues from Huanuco. According to M. Weddell, this species is widely diffused in Peru and Bolivia, and varies extremely in the character of its bark in different situations. In the parts visited by him, the finer qualities pass for Calisaya Bark; and in the Peruvian province of Carabaya, bordering on Bolivia, it is habitually employed to adulterate that bark. He also believes that much of the quilled bark of Loxa and Huanuco must be referred to this species. Von Bergen found that the *Cascarillo pallido* of Ruiz is identical with this variety. The Jean Bark is always in quills, and is of a dull, cinnamon colour, very brittle, and the fracture smooth in the smaller quills, uneven and splintery in the larger, and in neither exhibits a resinous appearance. The odour is sweetish, and is compared to that of tan; the taste acidulous, slightly astringent and bitter, without being disagreeable, and the colour of the powder cinnamon brown. It is very deficient in alkalies, some analysts having found none, or only traces, while the greatest quantity obtained was eighty grains of quinia, and thirteen grains of cinchonina, from one pound. An alkaline principle was obtained from it by M. Manzini, of Paris, which he called *cinchovatin*, but which is proved to be identical with the arichina of Pelletier. It is not improbable that some varieties of this bark may be produced from *C. scrobiculata*, a species united by Lindley with *C. micrantha*, but satisfactorily shewn by M. Weddell, who had the best opportunities of coming to a satisfactory conclusion on the point, to be a distinct species. According to Humboldt, it forms large forests in the mountains near the city of Jean de Bracomoros; and Weddell states that it is met with especially in the Peruvian provinces of Jean, Cuzco, and Carabaya. Large quantities of the bark were formerly collected by the people of Jean, and sent to Lima for shipment. At present the traders are principally at Cuzco. Another of the Pale Barks is that produced by *C. purpurea*, and called *Huamiles Bark*. The tree is of considerable size, and is distinguished by its foliage of a violet tint, and its

purple flowers. It is met with in groves in the lower mountain ridges in the provinces of Loxa, Jean, and Panatihuas; it is said also to grow in New Grenada. The bark occurs both in quills and flat pieces; the former from five to sixteen inches long, and the latter one to two inches broad, and six to twelve inches long. The colour of the surface is rusty brown, occasionally reddish, and the fibrous or splintery pieces are of an ochre yellow. The odour is feeble but agreeable; the taste somewhat aromatic, bitterish, and slightly astringent. The average quantity of cinchonia which it yields is 0·67 per cent., and of quinia 0·25. Weddell considers it the brown bark known in France as *Cusco Bark*, and closely to resemble the yellow carthagena bark derived from *C. cordifolia*. Cusco Bark is wholly without quinia, but is the source of a new alkali, discovered by Pelletier and Coriol, named *Aricina*, from the port of Arica whence the bark is said to be exported. This new alkali is white, crystallisable, and distinguished from cinchonia, which it in many respects resembles, by exhibiting a green colour under the action of nitric acid, and by the property possessed by its sulphate of forming a tremulous jelly when a saturated solution of the salt is allowed to cool. But Guibourt could obtain no other alkali from it than cinchonia, and considers aricina as the result of the modifying influence of the process employed in its preparation.

The source of the RED BARKS is involved in some obscurity. Mutis announced that it was from the species designated by him *C. oblongifolia*; but Guibourt has shewn the fallacy of this statement, and is of the same opinion as La Condamine, who stated that the Red Barks were derived from the same tree as produced the Pale Barks, but taken from larger branches or trunks. De Candolle, in his "Memoire" on the Cinchonas, thinks that they are produced from *C. scrobiculata*, but there is not sufficient evidence to support the statement. Weddell is also of the opinion that they are furnished by the same trees as the Pale Barks, as he observed that the latter are almost constantly nothing else than the young barks of the same trees which yield the yellow and red barks. In South America, the Red Bark is called *cascarilla roxa* and *colorado*. Like the Calisaya, it comes in quills and flat pieces, which are probably derived from different parts of the same tree. Its colour varies with the size of the pieces, being a reddish rusty-brown in the smallest, redder in the larger, and a full brownish-red in the largest. The inner surface is also sometimes yellowish or brownish, or of a dirty appearance. The odour is like that of tan, and earthy; the taste strongly, but not disagreeably bitter, somewhat aromatic, and not lasting; and the powder is of a dull brownish-red colour. Upon an average, it contains 1·7 per cent. of pure cinchonia, and 0·44 of sulphate of quinia; but the proportion of the alkalies is exceedingly various; for while Pfaff, from one specimen, obtained 3·17 per cent. of cinchonia, and 0·15 of sulphate of quinia, another yielded 1·21 per cent. of cinchonia, and 1·33 of quinia; and Pelletier and Caventou obtained 0·8 per cent. of cinchonia, and 1·7 of quinia. Guibourt makes six varieties of Red Barks.

CARTHAGENA BARKS include all those which are brought from the Atlantic ports of the northern countries of South America, and are also known by the names of *Maracaybo* and *Santa Maria Barks*. They contain a small proportion of quinia, and are generally sold in druggists' shops for tooth-powder under the name of *Common bark*. The most common of these is

the *Yellow Carthagena*, of which Bergen mentions two varieties:—1. *Hard yellow bark*. This is procured from *C. cordifolia*, a small tree, fifteen to twenty feet high, growing about Santa Fé de Bogota in New Granada, 5,800 to 9,500 feet above the level of the sea. It is in the form of quills and flat pieces. The colour of the epidermis varies from yellowish white to ash-grey, and is sometimes varied by bluish-grey or black lichens; the inner surface is always dull, as if dusty, varying between a light cinnamon and a dull ochre yellow. The odour is feeble, and the taste astringent and bitter, but not strongly so. On an average of two experiments, this yielded 0.57 per cent. of pure cinchonia and 0.36 of sulphate of quinia. 2. *Fibrous yellow bark*. This differs from the preceding in the longitudinal fracture being remarkably fibrous and in flat pieces; the fragments still hanging together by connecting fibres. The bark also breaks obliquely, and the fracture even of the epidermis, which in other varieties is almost always smooth, is in this uneven and rough-grained. The odour is feeble, the taste at first woody and flat, afterwards slightly bitter and astringent, and weaker in this than in any other variety of bark. It was found on analysis to yield 0.4 per cent. of pure cinchonia and 0.36 of quinia. From *C. magnifolia* (*C. oblongifolia* of Mutis) a worthless variety of bark is procured, known by the name of *Red Carthagena*. The tree grows in New Granada, and is abundant on the mountains of Panatahuas, about Cuchero, Chinca, and Chacahuassi. *C. lancifolia* is the source of *Orange Carthagena bark*, an inferior variety, without taste, or feebly bitter, and yielding a beautiful orange powder. The tree is a native of New Granada. There are many other varieties of *Cinchona* yielding barks which furnish in greater or less degree the properties of the true cinchona bark, but as they are of no commercial importance we shall pass them over, and confine our further observations, first, to the chemical constituents and medical properties of the true barks, and then give an account of the mode adopted in gathering and preparing them for commerce.

The constituents of *Cinchona* bark are:—1. A fatty matter, which is of a greenish colour as obtained from the pale bark, and orange from the yellow. It is insoluble in water, soluble in boiling alcohol, which deposits a part of it on cooling, very soluble in ether even when cold, and capable of forming soaps with the alkalies. 2. A red colouring matter, called *Cinchonic Red*, of a reddish-brown colour, insipid, inodorous, largely soluble in alcohol, especially when hot, and almost insoluble in ether or water, though the latter dissolves a little at the boiling temperature. 3. A yellow colouring matter, soluble in water and alcohol, and capable of being precipitated by the subacetate of lead. 4. Tannin. 5. Gum; but this is only found in the pale barks. 6. Starch. 7. Lignin. 8. Kinate of lime. 9. Kinic acid. 10. Cinchonia. 11. Quinia. The odour of the bark depends on a volatile oil obtained by distillation with water. It is of a thick consistence, and has a somewhat bitter acrid taste with the odour of bark. Of these it remains for us to treat only of the three last, which are by far the most important ingredients in *Cinchona* barks.

Kinic Acid, or, as it is sometimes called, *Cinchonic* and *Quinic Acid*, is generally in the form of a thick syrupy liquid; but when procured by spontaneous evaporation of the infusion of the bark, it is in the form of transparent colourless crystals, of a sour taste, and readily soluble in alcohol

and in water. *Kinate of Cinchonia* has a bitter and astringent taste, is very soluble in water, soluble also in alcohol, and is crystallized with difficulty. *Kinate of Quinia* is also soluble in water, but less so in rectified alcohol. Its taste is very bitter, exactly resembling that of yellow bark. It crystallizes in crusts of a mammilated form, and is opaque or semi-transparent. *Cinchonia*, or *Cinchonine*, when pure, is a white crystalline substance, soluble in 2,500 parts of boiling water, almost insoluble in cold water, very soluble in boiling alcohol, which deposits a portion in the crystalline state on cooling, and slightly soluble in ether and the fixed and volatile oils. It has a bitter taste, which, in consequence of its insolubility, is not very apparent at first, but after a short time it is developed by a small portion of saliva. *Cinchonia* consists of 1 equivalent of nitrogen, 20 of carbon, 12 of hydrogen, and 1 of oxygen. Exposed to the air it does not suffer decomposition, but very slowly absorbs carbonic acid, and acquires the property of effervescing very slightly with acids. *Sulphate of Cinchonia* is a white, very bitter salt, crystallizing in inflexible, somewhat shining, four-sided, flattened prisms, terminated by an inclined face, and generally collected in bundles. It is soluble in 54 parts of water at common temperatures, and in a smaller quantity of boiling water. *Quinia*, or *Quinine*, is whitish, generally flocculent in appearance, and not crystalline like cinchonia. It is fusible without chemical change at about 300 degrees of Fahrenheit, and becomes brittle on cooling. It is more bitter than cinchonia, is almost as insoluble in water, and is very soluble in alcohol, soluble also in ether and in the fixed and volatile oils. Its alcoholic solution is intensely bitter. It consists of 1 equivalent of nitrogen, 20 of carbon, 12 of hydrogen, and 2 of oxygen. The most important salt of this base is *Sulphate of Quinia*, which is in the form of fine silky, slightly flexible, needle-shaped crystals, interlaced among each other, or grouped in small star-like tufts. Its taste is intensely bitter, resembling that of the yellow bark, and its effects upon the system are the same as those of Peruvian Bark, without nauseating and oppressing the stomach.

When taken into the stomach, bark usually excites in a short time a sense of warmth in the epigastrium, which often diffuses itself over the abdomen and even the breast, and is sometimes attended with considerable gastric and intestinal irritation. Nausea, and even vomiting, are sometimes produced, especially if the stomach was previously in an inflamed or irritated state; and purging is not an infrequent attendant on its action. After some time has elapsed, the circulation experiences its influence, as exhibited in the somewhat increased frequency of the pulse; and if the dose be repeated, the whole system becomes more or less affected, and all the functions undergo a moderate degree of excitement. Its action upon the nervous system is often evinced by a sense of tension or fulness, or slight pain in the head, singing in the ears, and partial deafness, which are always experienced by many individuals when brought completely under its influence. These effects, therefore, entitle bark to rank at the very head of tonic medicines. But, besides these, it produces other effects on the system; and the power which it possesses, when administered in the intervals between the paroxysms of intermittent disorders, interrupting the progress of the disease, is something more than is usually understood by the tonic property; for no substance belonging to the class however powerful or perma-

ment may be the excitement which it produces, exercises a control over intermittents at all comparable to that of the medicine under consideration. As in these complaints it is probable that, in the intervals, a train of morbid actions is going on out of sight, within the recesses of the nervous system, so it is also probable that bark produces, in the same system, an action equally mysterious, which supersedes that of the malady, and thus accomplishes the restoration of the patient.

Peruvian Bark is collected by a class of persons who are called Cascarilleros, who are trained to the work from their infancy. The forests where the trees grow are at a distance of eight or ten days' journey from any inhabited place; and when the season draws nigh, these people form themselves into a party, placing one of them at the head of it, with the title of "mayordomo." Arrived at the point where the trees most abound, they form a camp, and then issue out, either singly or in small bands, in quest of the object of their search; and as they have sometimes to travel great distances, each man takes with him sufficient provisions for a long absence. As the cinchonas do not form forests of themselves, the Cascarilleros ascend an elevated position, or climb the highest trees, where they can descry, not only the cinchonas, but the particular species of which they are in quest. Having found a suitable tree, it is felled as near the soil as possible; the branches are removed, and then, with a wooden mallet or the back of an axe, the outer or dead layers of the bark are removed. Incisions are made in the bark, so that pieces fifteen or twenty inches long, by three or four broad, are removed, by means of a knife or other instrument. The pieces thus obtained from the branches are simply allowed to dry in the sun, and, rolling themselves up, form the quilled variety. The bark taken from the trunk is placed in square piles, one above the other, and the whole kept down by some heavy weight, which prevents them from rolling as they dry. When sufficiently dried, it is carried to the camp on the back of the gatherer, and there it is assorted, and the portion deemed fit for commerce is sent to the town, on the backs of men or mules, where it is packed in bales covered with fresh hides. Great waste prevails, the only object being present remuneration; and not only is the tree for ever destroyed, but the stump is barked even into the earth, so as to prevent it from throwing up shoots, and ultimately yielding a new crop.

Hymenodictyon excelsum is a large tree, from forty to fifty feet high, a native of the mountainous parts of the Circars of India, and furnishes a bark of great bitterness and astringency; the two inner layers are remarkable for these properties, and, when fresh, in a stronger degree. The bitterness is not quickly communicated to the taste on chewing the bark, but is very durable, chiefly about the upper part of the fauces. Dr. O'Shaughnessy analysed the bark from the Botanic Garden at Calcutta, but could find no alkaline ingredient. The wood is firm, close-grained, of a pale mahogany colour, and very useful for many purposes. *Exostemma caribæum*, called in Jamaica *Sea-side Beech*, furnishes a bark, called *Caribbean Bark*, which is generally grey on the outside, though in some rough and scabrous, when well dried, and the inside of a dark-brown colour. Its taste is at first sweet, with a mixture of that of horse-radish and of the aromatics of the East; but, when swallowed, it is of that very bitterness and astringency which characterise the Peruvian Barks. The bark of *E.*

brachycarpum emits, when wounded, a whitish juice, which becomes of a brownish-purple colour on drying, and is easily reduced into a greyish-purple powder, which is at first sweet, but afterwards very bitter and astringent; from *E. floribunda*, that called *St. Lucia Bark* is obtained. The Brazilians apply the bark of *E. australe*, which is very bitter and astringent, as a substitute for Peruvian Bark; but in none of the barks of *Exostemma* have either quinia, cinchonia, aracinia, or pitayinia, been found. *Pitayinia* is a tasteless, crystallisable, alkaloid principle, forming bitter salts with the acids; but the source of the bark from which it is obtained is unknown; the bark itself ranks among the falso cinchona barks. The roots of *Manettia cordifolia*, a native of Brazil, in woods and hedges, are said to be an excellent remedy in dropsy and dysentery.

Hedyoticeæ.—The bark of *Condaminea corymbosa* is slightly bitter, and is collected chiefly for the purpose of adulterating cinchona bark. The tree is very lofty, and is a native of the mountains of Peru. The bark of *Portlandia hexandra* (*Couteria speciosa*) is called *French Guiana Bark*, and is reputed to be a very powerful febrifuge. What is now so widely known as *Warburg's fever drops* is supposed to contain the active principle of the bark. The bark of *Wendlandia tinctoria* is employed in Bengal as a mordant by the natives in some of their dyes, and is by them called *Toola-lodh*. The inhabitants of Nepaul use the wood of *W. coriacea* for various purposes, such as rafters and tools. It is close-grained, becomes of a brownish colour after being cut, not unlike mahogany, and yields a red dye. *Sipanea pratensis*, a creeping annual plant indigenous to Cayenne, is used in Guiana in astringent ptisans and in the cure of gonorrhœa; and a decoction of it is used to wash ulcers and other sores. The root of *Ophiorhiza mungos*, a native of Ceylon, is very bitter, and is considered an antidote to the bite of the riband snake; but Dr. Roxburgh altogether discredits these reputed virtues. *Oldenlandia umbellata*, a native of India and Mexico, is cultivated on the coast of Coromandel for the sake of its long, orange-coloured roots, which are used for dyeing red, purple, a deep clear brown, orange, and to paint the red figures on chintz. It is called by the natives *Chay* or *Che root*, and the native physicians say that it cures poisonous bites, colds, and cutaneous disorders, and warms the constitution. The root is white and tasteless, and it is in the bark that the colouring principle resides; this principle is said to improve by the root being kept for three or four years. It is called *Imburel* by the Tamuls, and *Tsherivello* by the Telingas. The wood of *Isertia coccinea*, as also a decoction of the leaves, is used by the Creoles of Guiana and Cayenne in fomentations. *Hamelia ventricosa*, a native of Port Royal mountains in Jamaica, furnishes boards for tables and cabinets, of the softness and grain of Elm, and hence it has been called *Spanish Elm*, and by cabinet-makers it is called *Prince wood*.

Guettardeæ.—The root of several species of *Morinda*, or *Indian Mulberry*, yields a red colouring matter. *M. tinctoria* is a small tree growing plentifully all over the East, and in some parts of India is cultivated for its roots, the bark of which is used to dye red, the colour being fixed with alum. In the Circars, the dyers use the bark of the fresh roots bruised and gently boiled in water for a short time. The cloth or yarn is prepared in a cold infusion of the powdered galls of *Terminalia chebula* in milk and water, and when dried, and moistened with alum water, and dried again, it receives

from the decoction a beautiful but fleeting red. The green fruit is eaten in curries by the Hindoos. The wood is very hard and durable, variegated with red and white, and is employed for gun stocks in preference to every other kind. About Nagpore, *M. Multiflora* is cultivated also for its roots, which are used for the same purpose as those of *M. tinctoria*; and in other parts of India, those of *M. augustifolia*, *citrifolia*, *roioc*, and *chachuca*, are likewise employed. The roots of *Pæderia fætida* are used as an emetic by the Hindoos.

Coffeæ.—*Plectronia ventosa* is found in woods at the Cape of Good Hope, and is there called *Schapendrolletjes* by the Dutch settlers. It is a small tree, ten to fifteen feet high, and six to ten inches in diameter. The wood is very hard, close-grained, and tough, receives a high polish, and has the appearance of marble. It makes very handsome furniture, but, being small, its use can only be applied to the finer descriptions of cabinet-work. The celebrated Brazilian drug *cahinca*, or *cainca*, is derived from some species of *Chiococca*, but it is not known with certainty which species it is that yields it. It was first supposed to be obtained from *C. racemosa*, a native of the West Indies, Mexico, and Carthageria; but Dr. Martius found the roots of *C. densiflora* and *C. anguifuga* possessed the same properties, and as the medicine is of Brazilian origin, there can be little doubt but that these two species are the sources from which it is derived; but on the other hand, Achille Richard states that he received *C. racemosa* from Brazil. The drug is called *raiz preta*, or black root in Brazil, and is the root of one or other, or all, of these plants. An infusion of the bark of the root is a powerful emetic, purgative, diuretic, and tonic; and when given, so as to check its purgative tendency by keeping the skin warm and using warm drinks, it produces perspiration and sleep. In some cases it occasions nausea and griping, and in very large doses always acts powerfully, both as an emetic and cathartic. By respectable practitioners this has been used in dropsy with excellent results. In Brazil it has long been employed by the natives as a remedy against the bites of serpents. Martius says, one of the most efficacious and commonly used remedies are the leaves and roots of *C. anguifuga*, which are pungent, penetrating, and have a disagreeable smell, much resembling senega and valerian. The patient must drink great quantities of the decoction, and the poultices of the fresh-bruised leaves and roots are frequently repeated alternately with those of several other plants, as *Plumbago scandens*, which draws blisters, and some others. If the use of the *raiz preta* produces considerable evacuations, hopes are entertained of the cure, and violent perspiration is considered as a particularly favourable sign. The great reputation this medicine enjoyed in Europe at one time has declined, and it is now seldom used: it was given as a diuretic and purgative, in a dose varying from a scruple to a drachm. The root was analysed by Pelletier and Caventou, and found to contain—1. A green and odorous fatty matter, in which all the odour of the root resides. 2. A yellow colouring matter. 3. Another viscid coloured substance. 4. A very bitter crystallizable principle, to which the root owes its bitterness, and called *cahinic acid*. This is white, inodorous, very bitter and acrid, with difficulty soluble in water, easily soluble in alcohol, and less soluble in ether.

Next to the Cinchona barks, the most valuable product of the family is *Coffee*, which is the seeds of the shrub *Coffea arabica*. According to Abbé

Raynal, the shrub is a native of Upper Ethiopia, whence it was transported to Arabia, towards the end of the fifteenth century. Bruce is also of opinion that it is a native of Africa, and says that it derives its name from Caffee, a province of Narea, where it grows spontaneously in great abundance. The shrub is from five to fifteen feet high, and the fruit is a sort of berry, about the size of a small cherry, containing two nuts, which are flat on the sides, on which they lie close to each other, and convex on the other. Each of these contain a cartilaginous seed of the same form, with a deep longitudinal fissure on the flat side; and it is these seeds which form the coffee of commerce. The principal sorts are—*Mocha Coffee*, which is the most highly esteemed. It is brought from Arabia, being grown in the neighbourhood of Mocha, in the province of Yemen. This variety is small, yellowish, and often almost round, which is caused by the frequent abortion of one of the two seeds, the one which is left being free to assume somewhat of the shape of the fruit. Its odour and taste are much more agreeable than in the other varieties, particularly when roasted. It is packed in large bales, each containing a number of smaller ones, and, when good, appears fresh, and of a greenish olive colour. The next in quality is that grown in Java and the East Indies. *Bourbon Coffee* is of good quality, larger and not so round as Mocha; but it ought not to be confounded with a kind growing wild on the island, which is the seed of *C. mauritiana*, and called *café marron*, and which is of an elongated shape, and curved in the form of a horn at the extremity. This has a bitter taste, and is considered slightly emetic in its effects. *Martinique Coffee* is large, long, and of a greenish colour, covered with a silvery skin, which comes off in roasting; the longitudinal fissure is very marked and open. The odour is free, and the taste is somewhat like that of wheat. *St. Domingo Coffee* is very irregular, and has rarely a skin upon it; of a pale green or whitish colour, and with a much less agreeable odour and flavour than the preceding. Coffee improves by age, losing a portion of its strength, and thus acquiring a more agreeable odour and flavour. It is said to be much better when allowed to be perfectly ripe upon the tree, than as ordinarily collected. The grains should be hard, and so heavy as to sink readily in water. When soft, light, black, dark-coloured, or musty, they are inferior.

Coffee undergoes considerable change during the process of roasting. It swells, and acquires nearly double its former size, while it loses about twenty per cent. of its weight. It acquires, at the same time, a peculiar odour, entirely different from that of the unaltered seeds, and a decidedly bitter taste. A volatile oil and a portion of tannin are developed during the process, and it is to develop this oil and the beautiful aroma, which is so much to be desired in roasting. The excellence of the flavour of roasted coffee depends much upon the manner in which the process is conducted, and the extent to which it is carried. It should be performed in a covered vessel, over a moderate fire, and the grains should be kept in constant motion; when these have acquired a chesnut-brown colour, the process should cease. If continued for too long a period, it renders the coffee unpleasantly bitter and acrid, or, by reducing it to charcoal, deprives it entirely of flavour. The coffee should not be roasted long before use, and should not be kept in the ground state.

Coffee yields, on analysis, according to the analysis of Payen, 34 of

cellulose; 12 of hygroscopic water; 10 to 13 of fatty matter; 15.5 of glucose, with dextrine and a vegetable acid; 10 of legumine; 3.5 to 5 of chlorogenate of potassa and caffein; 3 of a nitrogenous body; 0.8 of free caffein; 0.001 of concrete volatile oil; 0.002 of fluid volatile oil; and 6.697 of mineral substances. *Caffein* was first discovered by Runge, and afterwards by Robiquet. It exists in coffee partly free, partly in the form of a double salt, consisting of a peculiar acid, called *chlorogenic acid*, combined with potassa and caffein. By the cooling of its concentrated solution, it crystallizes in opaque, silky, flexible needles, and by slow and spontaneous evaporation, in long, transparent prisms. It has a feeble, bitter, and disagreeable taste; is soluble in water, alcohol, and ether; melts when exposed to heat; and, at a higher temperature, sublimes, without residue, in needles analogous to those formed by benzoic acid. It consists of nitrogen 2, carbon 8, hydrogen 5, oxygen 2; and it is believed to be identical with thein, which is the peculiar principle of tea.

As a beverage, the use of coffee is too well known to require description here. Its action on the system is directed more particularly to the nervous system, which it reanimates. When taken, it produces a warming, cordial impression on the stomach, quickly followed by a diffused agreeable nervous excitement, which extends itself to the functions of the brain, giving rise to increased vigour of imagination and intellect, without any subsequent confusion or stupor, such as characterises the action of narcotic medicines. Indeed, one of the most extraordinary effects is a disposition to wakefulness, which continues for several hours after it is taken. It is even capable of resisting, to a certain extent, the intoxicating and soporific influence of alcohol and opium, and may sometimes be advantageously employed for this purpose. A cup of coffee taken after a hasty meal, will often relieve the sense of oppression so apt to be experienced, and enable the stomach to perform its office with comparative facility. It is an excellent stomachic, vermifuge, antiseptic, and tonic. It increases the action of the blood, dissipates nervous headaches, and is beneficial in intermittent fevers. But, taken in excess, it causes vertigo, a disposition to apoplexy, by causing a determination of blood to the brain. It also irritates the nervous system, causing trembling of the limbs, paralysis, and faint-heartedness. It increases the nervous action of those subject to hypochondria and hysteria. In increasing the action of the blood, coffee induces hemorrhoids and menorrhagia. It is injurious to pregnant women, and even conduces to barrenness.

The Coffee Tree is raised from seed which is sown in nurseries, and planted out when required. A moist, shady situation, is chosen for the plantations, generally at the foot of the mountains, and great care is taken to conduct little rills of water, in small channels, to the roots of the trees, it being absolutely necessary that they should be constantly watered, to produce and ripen the fruit. These channels or trenches are made about three feet wide, and five feet deep, and are lined and covered with stone, in order to prevent the moisture from evaporating. When the fruit is nearly ripe, the water is turned off from the roots, that the berry may not imbibe too much moisture, which would swell it to a large size, but render it comparatively flat and insipid. In places lying open to the south, the coffee-trees are sheltered by a kind of poplar, planted at certain distances, which

affords a thick shade. Without such precaution, the sun would, it is supposed, parch and dry the blossoms, so as to prevent their being succeeded by fruit; in situations not so much exposed to the sun, this precaution is unnecessary. When the fruit has arrived at maturity, so that it drops readily on shaking the trees, linen cloths are spread to receive it, and it is gathered in that manner. The berries are spread upon mats, and exposed to the sun until they are perfectly dry; after which the husk is broken with large, heavy rollers, and the coffee thus cleared is again dried in the sun; for unless its moisture be completely evaporated, it is apt to heat in the ships. It is then winnowed with a large fan, and the broken and bad coffee picked out; the rest is fit for market. Such is the mode of cultivation in Arabia. In the West Indies, as soon as the fruit is of a deep red colour, it is reckoned to be ready for gathering. Large linen bags, kept open by means of hoops, are suspended by the negroes from their necks; they pull the berries with their hands, and, after filling the bags, empty them into a large basket. A single negro can easily gather three bushels in a day. The berries are dried in two ways. The first is to place them in the sun, and in a few days the pulp is discharged by fermentation, and in about three weeks the coffee is completely dry. The skin is removed by mills, or by rubbing in wooden mortars. The second method is to separate the pulp from the seeds at once, by means of a mill, and the seeds are then left to soak in water for twenty-four hours; they are afterwards dried, and stripped of the pellicle or skin by means of appropriate mills.

Coffee was introduced to this country by one Daniel Edwards, a Turkey merchant, in 1652. He brought home with him a Greek servant named Pasque, who understood the methods of roasting coffee, and making it into a beverage; and this man, having established himself in a house in George-yard, Lombard-street, was the first who publicly sold coffee in England.

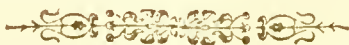
The next in importance of the plants belonging to this family are those producing *Ipecacuanha*, and of these there are several; but that which produces the true officinal *Ipecacuanha* is *Cephaelis Ipecacuanha*. This is a small shrub, not more than six inches to a foot high, a native of the woods of Brazil, in moist shady places. The roots are the parts which furnish the drug. They are simple, or a little branched, and furnished with a few short radicles irregularly bent, brown externally, wrinkled from rings, and somewhat fleshy when fresh. They are collected chiefly by the Indians during the months of January and February, when the plant is in flower, and are prepared by separating them from the stem, cleaning them, and hanging them in bundles to dry in the sun. The different varieties known as *Brown*, *Red*, and *Grey Ipecacuanha*, are all derived from the same plant, and owe their variety of colour either to the soil, difference of age, or mode of drying. *Ipecacuanha* has a bitter, acrid, and very nauseous taste. In large doses it is emetic; in smaller, diaphoretic and expectorant; and in still smaller, stimulating to the stomach, exciting appetite, and facilitating digestion. Its emetic property resides in an alkaline principle, discovered by Pelletier, and called *emetia* or *emetine*. When subjected to analysis, it yielded in the hundred parts 16 of an impure salt of emetia, which was at first considered the pure emetic principle; 2 of an odorous fatty matter; 6 of wax; 10 of gum; 42 of starch; 20 of lignin, with 4 parts emetia; traces of gallic acid have also been detected. Emetia when pure is white,

inodorous, slightly bitter, pulverulent, unalterable in the air, very fusible, sparingly soluble in cold water and ether, more soluble in hot water, and very soluble in alcohol. It has been used as a substitute for the drug, but its action is much more violent, and in over-doses is apt to produce dangerous consequences. Magendie found that ten grains of the impure alkali administered to dogs destroyed life after twenty-four hours, and the mucous membranes were found to be inflamed throughout their whole length. *Black*, or *Peruvian Ipecacuanha*, is the root of *Psychotria emetica*, also a very small shrub. It grows in Peru and New Grenada, and was for a long time considered, on the authority of Mutis, as the source of the true drug; but it is much less active. According to the analysis of Pelletier, it contains 9 of emetia, 12 of fatty matter, and 79 of lignin, gum, and starch. The roots of several species of *Borreria*, as *B. ferruginia* and *Poaya*, are used in Brazil as substitutes for ipecacuanha, as are also those of *Richardsonia scabra*, under the name of *White Ipecacuanha*.

Stellatæ.—The *Sweet Woodroof* (*Asperula odorata*) is found plentifully in many parts of Britain growing in woods and shady places. When dried, the leaves have an agreeable fragrance, somewhat like new hay, approaching to bitter almonds. It is considered diuretic, and is sometimes used as a substitute for tea. *A. cynanchica*, also a native of Britain, is slightly astringent, and was formerly employed in gargles in inflammations of the throat, and hence was called *Quinsy Woodroof*. The root of *Rubia tinctorum* furnishes *Dyer's madder*. The plant is a native of the south of Europe, and is extensively cultivated about Avignon and in Alsace for the roots, which afford the fine scarlet dye so highly valued by dyers and calico printers. A great quantity is grown in the Levant, the north of Africa, and in Holland; but that from Africa and the East, particularly that from Cyprus, is the most esteemed. Several attempts have been made to cultivate it in this country, but without profitable success. The roots are dug up in the third summer after sowing, and having been deprived of their cuticle, are dried by artificial heat, and then reduced to a powder. Madder has a bitter, astringent taste, and imparts these properties to water and alcohol. It contains a red, a purple, an orange, a yellow, and a brown. According to M. Decaisne, yellow colouring matter only is found in the fresh root, and it is under the influence of atmospheric air that it changes to red. The root has been analysed by Kuhlmann, Robiquet, and Colin. The first showed that it contained a free acid, analogous to malic acid; a considerable quantity of sugar, which enables the aqueous maceration to undergo spirituous fermentation; gum; a red colouring matter; a yellow colouring matter; and various salts of potassa. But MM. Robiquet and Colin were the first who discovered the colouring principle in its purity, and named it *Alizarine*, from Alizari, which is the name given to madder in the Levant. This substance is of an orange-red colour, in the form of long, needle-shaped crystals, inodorous, insipid, insoluble in cold water, slightly soluble in hot water, and very readily so in alcohol, ether, the fixed oils, and liquid alkalies. The alcoholic and watery solutions are rose coloured; the ethereal, golden-yellow; the alkaline, violet and blue when concentrated, but violet-red when sufficiently diluted. A beautiful rose-coloured lake is produced by precipitating a mixture of the solutions of alizarine and alum. Robiquet and Colin also detected the existence of another colouring matter in madder

which they called *purpurine*, darker and more rich in appearance than alizarine, but furnishing less varied tints, and not so permanent. In its effect on the animal system, madder was considered emmenagogue and diuretic, and was formerly used in dropsy, jaundice, and female and visceral obstructions; but it is not now recognised by practitioners as of any importance. When administered in the state of decoction, it tinges the milk, the urine, and the bones red. The roots of *R. reibun*, a native of Chili and Peru, and those of *R. chilensis*, are used for the same purpose as those of common Dyer's Madder.

All the species of *Galium* are known by the name of *Bedstraw*, because several of them were used in former times to strew beds with, before the invention of feather beds. *Galium mollugo* is called *Wild Madder*, or *Great Hedge Bedstraw*, and is a common plant in Britain. Like the true madder, its roots yield a red dye, but of a brighter colour, and the bones of animals which feed on them are dyed red. It is said that the North American Indians dye their feathers and other ornaments with the roots of *G. tinctorum*, which grows plentifully on marshy places in Canada and the north-west States; and those of *G. septentrionale* are similarly used by the Cree Indians. *G. verum*, or *Lady's Bedstraw*, is found plentifully in Britain. Boiled in alum-water, the flowering stems dye a good yellow colour. The roots dye a fine red, not inferior to madder. It is also called *Cheese-remmel*, from being formerly supposed to curdle milk. It has an astringent, acidulous, bitterish taste; and the bruised plant is sometimes used to tinge cheese yellow, by introducing it into the milk before coagulation. The plant was at one time highly esteemed in epilepsy and hysteria, and was applied externally to cutaneous eruptions. Common *Cleavers*, or *Goose-grass*, is plentiful in the hedges of Britain, and is well known by its property of adhering to whatever it comes in contact with, from the retrograde prickles on the stalks, and the keel and margins of the leaves; hence it has been called *Catchweed*, or *Scratchweed*. Linnæus states that the stalks are used in Sweden as a filter to strain milk through. The expressed juice is said to be aperient, diuretic, and antiscorbutic, and has been used in dropsy, congestion of the spleen, serofula, and scorbutic eruptions. The fresh herb, in the form of ointment or decoction, is supposed to have a beneficial effect on serofulous swellings. The root dyes red, like some of the other species.



ORDER CIV.—VALERIANACEÆ—VALERIAN FAMILY.

HERBACEOUS annuals and perennials. Root *Leaves* in bundles, those onFig. 130. *Centranthus macrosiphon*.

A, Flower of Valerian, showing an expanded pappus of the calyx.

B, Section of the fruit of *Fedia fagopyrum*.

one to five, adnate to the tube of the corolla, but with free anthers. *Ovary* inferior, with one to three cells, of which two are without ovules, Fig. B; *style* thread-like; *stigma* undivided or trifid. *Fruit* dry, one-celled, one-seeded, and unopening, or with three cells, of which two are sterile. *Seed* pendulous, without albumen. *Embryo* straight, with a superior radicle and two flat seed-lobes.

GENERA AND SYNONYMES.

<i>Patrinia</i> , Juss.	<i>Polypremum</i> , Ad	<i>Mitrophora</i> , Neck	<i>Arctiastrum</i> , DC.
<i>Gytonanthus</i> Raf	<i>Odontocarpa</i> , Nek	<i>Plectritis</i> , DC.	<i>Phu</i> , DC.
<i>Fedia</i> , Ad.	<i>Astrephia</i> , DC.	<i>Centranthus</i> , DC.	<i>Betekia</i> , DC.
<i>Nardostachys</i> , DC.	<i>Hemesotria</i> , Raf.	<i>Kentranthus</i> , Neck	<i>Triplostegia</i> , Wall.
<i>Patrinia</i> , Don.	<i>Oligæoce</i> , W.	<i>Valeriana</i> , Neck.	<i>Axia</i> , Lour.
<i>Dufresnia</i> , DC.	<i>Fedia</i> , Mönch.	<i>Phyllactis</i> , Pers.	<i>Porteria</i> , Hook.
<i>Valerianella</i> , Mön.			

GEOGRAPHICAL DISTRIBUTION.—Plentiful throughout the Old Continent in central Europe, the shores of the Mediterranean, extending by the Caucasus away over Siberia and Nepaul, even to Japan. In the New World, they are found abundantly on the shores of the Pacific as far as the Straits of Magellan. They are scarce in North America and in Africa.

PROPERTIES AND USES.—The active properties of the plants of this family appear to reside in the roots, and are not found in any remarkable degree except in the Valerians, all the species of which are, with a few exceptions, perennial. There is also found in a great many of the species the camphorated and bitter taste which is met with in *Valeriana officinalis*. Some are used as salad plants.

The *Spikenard* of the ancients has now been satisfactorily ascertained, by the researches of Sir William Jones and Dr. Royle, to be the produce of *Nardostachys jatamansi*. By the ancients it was held in high estimation, being used at baths and feasts as a favourite perfume. Its odour had the reputation of exciting amorous desires, and was as highly prized by the Roman women as it is by those of Nepaul in the present day. It seems to have obtained a high value among the Romans, so much so that the contents of a small box made of precious stone was considered an equivalent for a large vessel of wine, and a proper contribution for a guest to make to an entertainment, according to the ancient custom; and as an evidence of which, we have the complaint of Judas, when the woman anointed our Saviour's feet, that "the alabaster box of ointment, very precious, might have been sold for three hundred pence, and given to the poor." The smell of spikenard, according to our taste, is far from agreeable; and Dr. F. Hamilton thinks that the Roman lovers must have had a very different taste from the youth of modern Europe. The ladies of Nepaul consider the smell very agreeable, and such as can afford it, use oil impregnated with this root for perfuming their hair. The plant grows in the mountains of Nepaul, in the provinces of Mandou and Chitor, in Delhi, Bengal, and Deccan. The root, which is from three to twelve inches long, fibrous, of a blackish colour, sending up above the ground between thirty and forty spikes, from which it has its name. *Valerianella olitoria* is a native of Great Britain, and is cultivated in gardens as a salad plant under the name of *Corn Salad* and *Lamb's Lettuce*; by the French it is called *Mâche*. *Centranthus ruber* is used in Sicily as a salad in the same way. *Astrephia charophylloides* is used by the Peruvians as a vulnerary. The roots of *Valeriana celtica* and *V. salicina* are used in the East to perfume baths. The roots of those which grow on the Alps are collected, with great danger and difficulty, by the peasantry of Styria and Carinthia, from rocks on the borders of perpetual snow. They are tied in bundles, and sold at a very low price to merchants, who send about sixty tons annually, by way of Trieste, to Turkey and Egypt, where they are sold at a very high price, and transmitted to the nations of India and Ethiopia; the Hungarians use them in lotions for the head; and in the Levant they are esteemed as a perfume and cosmetic. The root of *V. Phu*, or *Garden Valerian*, is the *Spikenard of Crete*, mentioned by Pliny. It has a smell similar to that of common valerian, and though not so strong, is nevertheless disagreeable, and its taste is more bitter. The root, in powder, is administered in spasmodic diseases, and is tonic and active, but in large doses it occasions scintilla-

tions, agitation, and even convulsions. The root of *V. Hardwickii* is used medicinally by the Nepaulese. The root of *Common Valerian* (*Valeriana officinalis*) is bitter and acrid, with a penetrating and fetid odour, very disagreeable to some persons, but not so much objected to by others; but it has the singular power of attracting cats, who, as soon as they see the plant, roll upon it, and it is with difficulty that they can be driven from it. It seems to have the effect of causing a sort of intoxication similar to that produced by opium on Orientals. Used medicinally, the root is gently stimulant, with a marked tendency towards the nervous system, but without any narcotic effect. In large doses, it produces a sense of heaviness and dull pain in the head, with various other nervous indications. It is powerfully excitant, and acts secondarily as antispasmodic, emmenagogue, sudorific, and vermifuge. It has been given with success, either alone or combined with Peruvian bark, in intermittent fevers. It is, in fact, held by some to be very tonic and stimulant, and appears to be also slightly narcotic. Trommsdorff found that it contained 1.2 parts of volatile oil; 12.5 of a peculiar extractive matter, soluble in water, insoluble in ether and alcohol, and precipitated by metallic solutions; 18.75 of gum; 6.25 of a soft odorous resin; and 63 of lignin. Of these constituents, the most important is the essential oil, in which the virtues of the root chiefly reside. It is of a pale-greenish colour, of the specific gravity 0.934, with a pungent odour of valerian, and an aromatic taste. It becomes yellow and viscid by exposure. Trommsdorff found it contained a peculiar volatile acid called *Valerianic* or *Valeric acid*. This, when separated from the oil, is a colourless liquid, of an oleaginous consistence, having an odour like that of Valerian, and a very sour, disagreeable taste. The root of *V. setchensis*, a native of North America, is considered by the Russians as the most active of the whole genus.



ORDER CV.—DIPSACACEÆ.—THE TEASEL FAMILY.

HERBACEOUS plants, or under-shrubs. Leaves connate, either entire or



Fig. 131. *Scabiosa atropurpurea*.

A, corolla and calyx. B, section of involucre, showing ovary and calyx.

deeply divided, without leaflets at their base. *Flowers* hermaphrodite, more or less irregular, arranged in heads on a common receptacle, surrounded by an involucre, and each furnished with a double envelope, composed of an involucrel and a calyx. The involucrel enclosing the ovary, without adhering to it, Fig. B, is terminated by an entire or lobed limb. *Calyx* adhering to the ovary, and contracted at the summit into a very narrow neck, spreading out into a limb, which is either entire, toothed, or ending in numerous variable bristles, which are usually feathery, Fig. B. *Corolla* with four or five lobes, inserted on the summit of the tube of the calyx, Fig. A; rarely ringent, but generally irregular. *Stamens* four, with free anthers. *Ovary* inferior, Fig. B. *Style* thread-like. *Stigma* entire, or two-lobed. *Fruit* dry, one-celled, one-seeded, unopening, enclosed in the persistent involucrel, and crowned by the limb of the calyx. *Seed* pendulous, with fleshy albumen. *Embryo* straight, with a superior radicle.

TRIBE 1. *Morineæ*.—Corolla ringent. Stamens four, combined by twos. Flowers in whorls, with leaflets behind them.

GENERA AND SYNONYMES.

<i>Morina</i> , T.	<i>Acanthocalyx</i> , DC.
<i>Diotrothea</i> , Vail.	<i>Asaphes</i> , Sp.
<i>Diotocalyx</i> , DC.	

TRIBE 2. *Scabioseæ*.—Corolla four to five cleft, not ringent. Stamens four to five, free, nearly unequal. Flowers collected in heads, on a common receptacle, encircled by a general involucrem, and each flower girded by a calyx-like involucrel, Fig. B.

GENERA AND SYNONYMES.

<i>Dipsacus</i> , <i>T.</i>	<i>Succisa</i> , <i>Vaill.</i>	<i>Scabiosa</i> , <i>R. & S.</i>
<i>Galedragon</i> , <i>Gray.</i>	<i>Pynocomon</i> , <i>Wallr.</i>	<i>Asterocephalus</i> , <i>Vaill.</i>
<i>Cephalaria</i> , <i>Schrad.</i>	<i>Knautia</i> , <i>L.</i>	<i>Sclerostemma</i> , <i>Schott.</i>
<i>Lepicephalus</i> , <i>Legasc.</i>	<i>Trichera</i> , <i>Schrad.</i>	<i>Spongostemma</i> , <i>Rehb.</i>
<i>Cerionanthus</i> , <i>Schott.</i>	<i>Ptercephalus</i> , <i>Vaill.</i>	<i>Columbaria</i> , <i>Thuill.</i>

GEOGRAPHICAL DISTRIBUTION.—They inhabit the temperate and warmer extropical regions of the Old World, extending from the Cape of Good Hope to the shores of the Mediterranean and the East; rarely found in colder or elevated situations.

PROPERTIES AND USES.—The means employed by fullers to raise the nap on woollen cloths are by the heads of *Dipsacus fullonum*, hence called *Fullers' Teasel*. For this purpose, they are fixed round the circumference of a cylinder, which, being made to revolve against the surface of the cloth, raise the nap, by their hooked, stiff, spiny bracts; and this they do better and more effectually than any mechanical contrivance hitherto invented. In the clothing districts of Somersetshire and Yorkshire, the cultivation of Teasel is a matter of consideration. When harvested and dried, they are sorted into three different qualities, called “kings,” “middlings,” and “scrubs,” and made up into packs, which contain 9000 heads of the first sort, and 20,000 of the second. In some cases, before forming them into packs, they are done up into what are termed “staves,” by means of split sticks, when they are ready for sale. This plant is a native of the south of Europe, and may also be found wild in England; but it cannot be regarded as indigenous, having, in all probability, escaped from cultivation; but the *Wild Teasel* (*Dipsacus sylvestris*) may often be found growing by road-sides and in hedge-rows. The bracts of this species are not hooked at the points, and therefore the heads are not adapted to the use of the clothiers. The leaves, uniting at the base, and forming a basin round the stem, collect water, and the country people regard this water as a cure for warts, a remedy for bleared eyes, and as a beauty-wash for the face,—hence it is called *Venus'-bath*. The leaves, when dried, and given in powder or infusion, are supposed to free the stomach of flatulency and crudities. There is another curious custom practised by the country people of England. If the heads are opened longitudinally, in September or October, there is generally found a small worm in them; one only is found in each head. They collect three, five, or seven of these—always observing to make an odd number—and sealing them up in a quill, wear them as an amulet against the ague. The only other plant of this family claiming notice for its properties is *Scabiosa succisa*, or *Devil's-Bit*, a pretty British wild flower, growing in moist meadows and pastures. Linnæus says that the dried leaves are used to dye wool yellow or green. The root is astringent, and the infusion of it bitterish, but not unpleasant. Formerly it was regarded as a specific in numerous complaints, and its abrupt, stump-shaped root, gave rise to the superstitious idea mentioned by old Gerard, that “the devill bit it for enuie,” because it was of so much benefit to mankind; and hence it was called Devil's-Bit.

ORDER CVI.—CALYCERACEÆ—CALYCERA FAMILY.

HERBACEOUS plants. *Leaves* alternate, sessile, without leaflets at the



Fig. 132. *Acicarpa*
spathulata.

base. *Flowers* hermaphrodite or neuter, arranged in heads, surrounded by an involucre, and bearing bracts amongst the flowers. *Calyx* adhering to the ovary, of five unequal segments. *Corolla* regular, funnel-shaped, with a long, slender tube, and five segments, each of which is three-nerved. *Stamens* five, united in one bundle, with glandular spaces below, and alternating with them; *anthers* combined by their lower half. *Ovary* inferior, one-celled. *Style* smooth, club-shaped in the upper part. *Stigma* capitate, undivided. *Fruit* or seed-nuts crowned by the rigid, spiny segments of the calyx, Fig. A. *Seed* solitary, inverted, sessile. *Embryo* in the axis of fleshy albumen, slender, with plano-convex, obtuse seed-lobes, shorter than the superior radicle.

GENERA AND SYNONYMES.

Chionophila, Miers.
Gamocarpa, DC.
Nastanthus, Miers.
Boopis, Juss.
Calycera, Cav.

Anomocarpus, Miers.
Discophytum, Miers.
Leucocarpus, Turcz.
Acicarpa, Juss.

„ *Cryptocarpa*, R. Br.
Sommea, Bory.
Acanthosperma, Arrab.
Echinolema, Jacq. f.

GEOGRAPHICAL DISTRIBUTION.—They all inhabit South America; but are rare between the tropics, and are most frequent in the South of Chili, though nowhere plentiful. They extend from the sea coast to considerable elevations on the mountains.

They are not known to possess any properties

ORDER CVII.—COMPOSITÆ.—COMPOSITE FLOWERS.

HERRACEOUS or shrubby plants, sometimes small trees. *Leaves* alternate,

opposite, or in whorls, entire, or deeply divided. *Flowers* hermaphrodite, unisexual, or neuter, by abortion, generally arranged in a head, on a common receptacle, surrounded by leaflets, which thus form a sort of common calyx, or involucre, round the head of the flowers. Of the flowers which thus form the head, some have a regular, monopetalous, funnel-shaped *Corolla*, generally with five regular



Fig. 133 *Machæranthera tanacetifolia*. A, Section of the fruit of Senecio.

lobes, Fig. *a*, but sometimes bilabiate, Fig. *b*, and are called *Florets*; others have an irregular corolla, thrown to one side, in the form of a strap, and are called *Semi-florets*, Fig. *c*. Sometimes the heads of flowers are composed wholly of florets,—sometimes entirely of semi-florets; and sometimes the centre is occupied with florets, and the circumference with semi-florets; in the last case, the centre is called the *Disk*, and the circumference the *Ray*. At the base of each floret there are generally small scales or hairs, forming a sort of bract, Fig. *a*. *Calyx* united with the ovary, with a limb which is either entire, membranous, toothed, bristly, or feathered. *Corolla* inserted on the summit of the tube of the calyx. *Stamens* five, with the anthers united into a tube, which sheathes the style. *Ovary* inferior, with a one-ovuled cell. *Style* thread-like, sometimes swollen, and as if jointed at the summit; two-cleft, with the arms covered with papillæ or hairs. *Stigmas* placed on the superior face of the arms of the style. *Fruit*, Fig. A, generally dry, one-celled, one-seeded, unopening, crowned with the

limb of the calyx. *Seed* erect, without albumen. *Embryo* with a taper inferior radicle, and oily seed-lobes.

This great family is the most extensive, and contains almost the twelfth or eleventh part of the whole vegetable kingdom. It embraces about 9000 species, distributed over almost every country, and new discoveries are constantly adding to the number. The following is the mode of distribution which has been adopted by De Candolle:—



Fig. 134. A B C D E F G

SUB-ORDER I.—TUBIFLORÆ, Fig. a.

Corolla of all the perfect flowers, tubular, five, rarely three or four lobed, regular. The ray-flowers, when present, are either only pistillate, or with neither stamens nor pistils (neutral), and strap-shaped.

TRIBE 1.—*Vernoniæ*.—Heads most frequently without rays; all the florets hermaphrodite, only one genus being unisexual; rarely with rays, the semi-florets of which are strap-shaped, and pistillate or neuter. Style cylindrical, with the arms equally covered all over with bristles; in many, long and awl-shaped, and, in a few, short and obtuse, Fig. 134, G. Glands of the stigma arranged in prominent narrow series, terminating below the middle of the arms of the style.

SUB-TRIBE 1. *VERNONIDÆ*.—*Head* discoid—that is, without rays, all the flowers being tubular and perfect.

DIV. 1. *Vernonineæ*.—Head discoid, many-flowered, very rarely one-flowered. Anthers without tails. Involucre round, imbricated in many series. Receptacle naked or honeycombed. Leaves alternate, rarely opposite.

* *Pappus* wanting, or simple.

GENERA AND SYNONYMES.

Adenocyclus, Less.
Odontoloma, Kunth.
Oiospermum, Less.
Sparganophorus, Vaill.

Struchium, P. Br.
Xiphochæta, Pöpp.
Ethulia, Cass.
Kahiria, Forsk.

Leighia, Scop.
Pierarda, Ad.
Herderia, Cass.
Adenoon, Dalz.

* *Pappus* in one, two, or many series, of which all, or at least the interior one, are bristly.

GENERA AND SYNONYMES.

<i>Pacourina</i> , <i>Aub.</i>	<i>Baccharoides</i> , <i>L.</i>	<i>Strophopappus</i> , <i>DC.</i>
<i>Pacourinopsis</i> , <i>Cass.</i>	<i>Decaneurum</i> , <i>DC.</i>	<i>Stilpnopappus</i> , <i>Mart.</i>
<i>Meisteria</i> , <i>Scop.</i>	<i>Wightia</i> , <i>Sp.</i>	<i>Dialesta</i> , <i>Kunth.</i>
<i>Haynea</i> , <i>W.</i>	<i>Rolfinkia</i> , <i>Zenk.</i>	<i>Monosis</i> , <i>DC.</i>
<i>Heterocoma</i> , <i>DC.</i>	<i>Cyanopsis</i> , <i>Bl.</i>	<i>Blanchetia</i> , <i>DC.</i>
<i>Vernonia</i> , <i>Schreb.</i>	<i>Cyanthillium</i> , <i>Bl.</i>	<i>Symblomeria</i> , <i>Nutt.</i>
<i>Acilepis</i> , <i>Don.</i>	<i>Isonema</i> , <i>Cass.</i>	<i>Shawia</i> , <i>Forst.</i>
<i>Hololepis</i> , <i>DC.</i>	<i>Centratherum</i> , <i>Cass.</i>	<i>Turpinia</i> , <i>L. & L.</i>
<i>Proteopsis</i> , <i>Mart.</i>	<i>Ampherephis</i> , <i>Kunth.</i>	<i>Haplostephium</i> , <i>Mart.</i>
<i>Leptospermoides</i> , <i>DC.</i>	<i>Spixia</i> , <i>Schrank.</i>	<i>Lychnophora</i> , <i>Mart.</i>
<i>Vanillosma</i> , <i>Less.</i>	<i>Bechium</i> , <i>DC.</i>	<i>Albertinia</i> , <i>Sp.</i>
<i>Carpholobus</i> , <i>Scht.</i>	<i>Stokesia</i> , <i>Herit.</i>	<i>Eremanthus</i> , <i>Less.</i>
<i>Strobocalyx</i> , <i>Bl.</i>	<i>Cartesia</i> , <i>Cass.</i>	<i>Pycnocephalum</i> , <i>DC.</i>
<i>Trianthea</i> , <i>DC.</i>	<i>Platycarpha</i> , <i>Less.</i>	<i>Lycnocephalus</i> , <i>Mart.</i>
<i>Pollalesta</i> , <i>Kunth.</i>	<i>Cynara</i> , <i>Th.</i>	<i>Chronopappus</i> , <i>DC.</i>
<i>Oliganthes</i> , <i>Cass.</i>	<i>Odontocarpa</i> , <i>DC.</i>	<i>Pithecoseris</i> , <i>Mart.</i>
<i>Tephrodes</i> , <i>DC.</i>	<i>Webbia</i> , <i>DC.</i>	<i>Stachyanthus</i> , <i>DC.</i>
<i>Isomeria</i> , <i>Don.</i>	<i>Hoplophyllum</i> , <i>DC.</i>	<i>Chresta</i> , <i>Arrab.</i>
<i>Lepidaploa</i> , <i>Cass.</i>	<i>Piptocoma</i> , <i>Cass.</i>	<i>Leucopholis</i> , <i>Gard.</i>
<i>Ascaricida</i> , <i>Less.</i>	<i>Distephanus</i> , <i>Cass.</i>	<i>Bolanosa</i> , <i>Gray.</i>

DIV. 2. *Elephantopineæ*.—Anthers furnished with a tail. Involucre compressed, with alternate, conduplicate scales. Receptacle naked or honey-combed.

GENUS AND SYNONYMES.

<i>Elephantopus</i> , <i>L.</i>	„ <i>Distrepus</i> , <i>Cass.</i>
<i>Elephantosis</i> , <i>Less.</i>	„ <i>Matamoria</i> , <i>Llav. & Lex.</i>

DIV. 3. *Rolandrineæ*.—Head one-flowered. Involucre composed of one to five leaves; the scales often concrete. Anthers without tails at the base.

GENERA AND SYNONYMES.

<i>Gundelia</i> , <i>T.</i>	<i>Contarcna</i> , <i>Ad.</i>	<i>Trichospira</i> , <i>H. B. K.</i>
<i>Hacub</i> , <i>Vaill.</i>	<i>Solandra</i> , <i>Rottb.</i>	<i>Lagascea</i> , <i>H. B. K.</i>
<i>Gundelsheimera</i> , <i>Cass.</i>	<i>Spiracantha</i> , <i>H. B. K.</i>	<i>Noccea</i> , <i>Cass.</i>
<i>Corymbium</i> , <i>L.</i>	<i>Acosta</i> , <i>DC.</i>	<i>Lagasca</i> , <i>Cav.</i>

DIV. 4. *Bojerineæ*.—Anthers furnished with two tails.

GENERA.

<i>Synchodendron</i> , <i>Boj.</i>	<i>Tecmarsis</i> , <i>DC.</i>
<i>Centauropsis</i> , <i>Boj.</i>	<i>Bojeria</i> , <i>DC.</i>

SUB-TRIBE 2. PECTIDÆ.—Heads with rays; the florets of the disk all perfect and tubular; semi-florets of the ray strap-shaped, and either pistillate only, or without either stamens or pistils.

DIV. 1. *Liabineæ*.—Corolla of the disk regularly five-lobed. Arms of the style elongate. Leaves without glands and ciliæ.

GENERA AND SYNONYMES.

<i>Xanthisma</i> , <i>DC.</i>	„ <i>Pleionactis</i> , <i>DC.</i>	<i>Paranephelius</i> , <i>Pöpp.</i>	<i>Alibum</i> , <i>Less.</i>
<i>Hectorea</i> , <i>DC.</i>	<i>Viviania</i> , <i>W.</i>	<i>Liabum</i> , <i>Ad.</i>	<i>Cacosmia</i> , <i>H. B. K.</i>
<i>Andromachia</i> , <i>ПБ.</i>	<i>Platylepidea</i> , <i>DC.</i>	<i>Starkia</i> , <i>Juss.</i>	<i>Xantholepis</i> , <i>W.</i>
<i>Oligactis</i> , <i>Cass.</i>	<i>Platylepis</i> , <i>Less.</i>	<i>Andromachia</i> , <i>Cass.</i>	<i>Clairvillea</i> , <i>DC.</i>

Div. 2. Pectidineæ.—Corolla of the disk frequently irregular; arms of the style short. Leaves glandular, frequently ciliated at the base.

GENERA AND SYNONYMES.

Pectidopsis, <i>DC.</i>	Pectis, <i>L.</i>	Lorentea, <i>Less.</i>
Pectidium, <i>Less.</i>	Lorentea, <i>Lagasc.</i>	Cryptopetalum, <i>Cass.</i>
Pectis, <i>Cass.</i>	Chthonia, <i>Cass.</i>	Stainmarium, <i>W.</i>

TRIBE 2. Eupatorieæ.—Style cylindrical, with long, round, or club-shaped arms; papillose on the outside near the end, rarely hairy. Stigmatic series, slightly prominent, terminating below the middle of the arms of the style, rarely extending to the apex, and very rarely confluent, Fig. 134, f.

SUB-TRIBE 1. EUPATORIDÆ.—*Heads discoid—that is, destitute of rays—and all the florets tubular and hermaphrodite. Flowers never yellow.*

Div. 1. Alomineæ.—Pappus wanting.

GENERA.

Orsinia, <i>Bertol.</i>	Alomia, <i>H. B. K.</i>	Gymnocoronis, <i>DC.</i>
Piqueria, <i>Cav.</i>	Phalacrea, <i>DC.</i>	Isocarpha, <i>R. Br.</i>

Div. 2. Ageratineæ.—Pappus chaffy, with membranous or stiff scales distinct or united into a circle (corona).

GENERA AND SYNONYMES.

Cœlestinia, <i>Cass.</i>	Lavenia, <i>Swartz.</i>	Palcolaria, <i>Cass.</i>
Ageratum, <i>L.</i>	Sclerolepis, <i>Cass.</i>	Polypteris, <i>Nutt.</i>
Carelia, <i>Ad.</i>	Phania, <i>DC.</i>	Carelia, <i>Less.</i>
Pectinellum, <i>DC.</i>	Oxylobus, <i>Moç.</i>	Agrianthus, <i>Mart.</i>
Anisochæta, <i>DC.</i>	Stevia, <i>Cav.</i>	Helogyne, <i>Nutt.</i>
Adenostemma, <i>Forst.</i>	Polafoxia, <i>Lagasc.</i>	Hofmeisteria, <i>Walprs.</i>

Div. 3. Adenostylineæ.—Pappus bristly, rough, or feathery, arranged in one or many series.

GENERA AND SYNONYMES.

Kuhnia, <i>L.</i>	Suprago, <i>Gärt.</i>	Urolapis, <i>DC.</i>	Tragantha, <i>Wallr.</i>
Strigia, <i>DC.</i>	Trilisa, <i>Cass.</i>	Lophoclinium, <i>Endl.</i>	Nothites, <i>Cass.</i>
Critonia, <i>Gärt.</i>	Carphephorus, <i>Cass.</i>	Campyloclinium,	Mitkania, <i>W.</i>
Trichogonia, <i>DC.</i>	Decachæta, <i>DC.</i>	[<i>DC.</i>	Adenostyles, <i>Cass.</i>
Leigonia, <i>DC.</i>	Chromolæna, <i>DC.</i>	Bulbostylis, <i>DC.</i>	Cacalia, <i>T.</i>
Carminatia, <i>Moç.</i>	Ooclinium, <i>DC.</i>	Coleosanthus <i>Cass.</i>	Brickellia, <i>Ell.</i>
Disynaphia, <i>DC.</i>	? Praxelis, <i>Cass.</i>	Critonia, <i>P. Br.</i>	Neilreichia, <i>Fenzl.</i>
Clavigera, <i>DC.</i>	Conoclinium, <i>DC.</i>	Dalea, <i>P. Br.</i>	Trichogonia, <i>Gard.</i>
Liatris, <i>Schreb.</i>	Hebeclinium, <i>DC.</i>	Wickströmia, <i>Sp.</i>	Kanimia, <i>Gard.</i>
Anonymos, <i>Walt.</i>	Amblylepis, <i>Endl.</i>	Eupatorium, <i>T.</i>	

SUB-TRIBE 2. TUSSILAGIDÆ.—*Heads with rays, the semi-florets of which are either pistillate or neuter, and the florets of the disk hermaphrodite; or with unisexual florets.*

Div. 1. Petisitineæ.—Head with rays. Tubular flowers, pistillate. Flowers whitish or purple, never yellow.

GENERA.

Homogyne, *Cass.*
Nardosmia, *Cass.*

Petasites, *T.*
Adenocaulon, *Hook.*

DIV. 2. *Tussilagineæ*.—Head with rays, the flowers of which are pistillate, those of the disk hermaphrodite. Flowers always yellow; semi-florets of the ray yellow, or rarely rose-coloured.

GENERA.

Tussilago, *T.*
Celmisia, *Cass.*

Aleiopse, *DC.*
Brachyglottis, *Forst.*

TRIBE 3. *Asteroidææ*.—Heads most frequently with rays, rarely discoid or unisexual. Arms of the style in the hermaphrodite flowers flat or flattish, smooth up to the point where the conspicuous stigmatic lines terminate, and prolonged above this into a flattened appendage, which is uniformly hairy or pubescent outside, Fig. 134, D. Leaves almost always alternate.

SUB-TRIBE 1. *ASTERIDÆæ*.—Heads discoid, with hermaphrodite florets, or with strap-shaped rays. Receptacle not chaffy.

DIV. 1. *Amellinææ*.—Receptacle chaffy.

GENERA AND SYNONYME.

Amellus, *Cass.*
Corethrogyne, *DC.*
Chiliotrichum, *Cass.*

Tropidolepis, *Tausch.*
Heterothalmus, *Less.*

DIV. 2. *Asterinææ*.—Receptacle not chaffy, sometimes naked, sometimes honeycombed or fringed. Heads with various-coloured rays.

* *Pappus bristly both in the disk and the ray, in one or many series; bristles equal.*

GENERA AND SYNONYMS.

Mairia, *DC.*
Pteropappus, *Less.*
Zyrphelis, *Cass.*
Felicia, *DC.*
Polyarrhena, *Cass.*
Munychia, *Cass.*
Agathea, *Cass.*
Detridium, *Nees.*
Detris, *Ad.*
Bellidiastrum,
[*Michx.*]
Margarita, *Gaud.*

Bellidiaster, *Dum.*
Aster, *Nees.*
Amellus, *Ad.*
Symphyotrichum
[*Nees.*]
Tripolium, *Nees.*
Galatella, *Cass.*
Galatea, *Cass.*
Turczaninovia, *DC.*
Monoptilon, *T. & G.*
Townsendia, *Hook.*
Calimeris, *Cass.*

Eurybiopsis, *DC.*
Podocoma, *Cass.*
Podopappus, *Illk.*
Asteropsis, *Less.*
Arctogeron, *DC.*
Serieocarpus, *Nees.*
Machæranthera,
[*Nees.*]
Tetramolopium,
[*Nees.*]
Eucephalus, *Nutt.*

Lagatea, *Nutt.*
Henricia, *Cass.*
Döllingeria, *Nees.*
Heleastrum, *DC.*
Biotia, *DC.*
Eurybia, *Cass.*
Spongotrichum,
[*Nees.*]
Homostylium, *Nees.*
Warthemia, *Boiss.*
Astradelphus, *Rémy*

** *Pappus of the disk and the ray alike, in two series, the exterior short and somewhat chaffy, the interior elongated and bristly.*

GENERA AND SYNONYMS.

Olearia, *Möneh.*
Haxtonia, *Caley.*
Diplostephium, *Cass.*
Callistephus, *Cass.*

Callistemma, *Cass.*
? Poloa, *DC.*
Diplopappus, *DC.*
? Asterosperma, *Less.*

Rhinaetina, *Less.*
Noticastrum, *DC.*
Distasis, *DC.*

* * *Pappus hairy, sometimes in two or more series; the external one either equal or shorter.*

GENERA AND SYNONYMES.

Melanodendron, DC.	Stenaetis, Cass.	Terranea, Colla.
Leptocoma, Less.	Heterochaeta, DC.	Trimorphæa, Cass.
Vittadinia, A. R.	Therogeron, DC.	Rhynchospermum,
Fullertonia, DC.	Erigeron, DC.	[Reinw.]
Polyactidium, DC.	Leptostelma, Don.	Microgync, Less.
Polyactis, Less.		

* * * *Pappus of the disk different from that of the ray.*

GENERA AND SYNONYMES.

Simblocline, DC.	Charieis, Cass.	Madia, Sol.
Heteropappus, Less.	Kaulfussia, Nees.	Sommerfeltia, Less.
Phalaeroloma, Cass.	Chætopappa, DC.	Perityle, Benth.
Minuria, DC.	Chætophora, Nutt.	Laphamia, A. Gr.
Stenaetis, Nees.	Boltonia, Herit.	Pericome, A. Gr.
Gymnostephium, Less.		

* * * * *Pappus scaly.*

GENERA.

Calotis, R. Br.	Asteromæa, Bl
Huenefeldia, Walp.	Bellium, L.

* * * * *Pappus wanting, or in the form of a circlet.*

GENERA AND SYNONYMES.

Bellis, L.	Murocalia, A. R.	Keerlia, DC.
Brachycome, Cass.	Ixauchenus, Cass.	Aphanostephus, DC.
Brachystephium, Less	Ixiauchenus, Less.	Platystephium, Gardn.
Paquerina, Cass.	Myriaetis, Less.	Emphysopus, Hook. f.
Lagenophora, Cass.	Botryadenia, Fisch.	Ctenosperma, Hook. f.
Lagenifera, Cass.	Garuleum, Cass.	

DIV. 3. *Chrysocomeæ*.—Receptacle not chaffy, sometimes naked, sometimes honeycombed or fringed. Heads yellow, sometimes with florets all tubular and hermaphrodite, sometimes radiate, with pistillate or neutral rays of the same colour.

* *Pappus wanting.*

GENERA AND SYNONYME.

Xanthocoma, H. Bk.	Gymnosperma, Less.
Xerothermus, DC.	Selloa, Sp.
Anaglypha, DC.	

* * *Pappus chaffy, many-rayed.*

GENERA AND SYNONYMES.

Brachyrus, Nutt.	Lepidophyllum, Cass.	„ Donia, R. Br.
Brachyachyris, Sp.	Grindelia, W.	Aurelia, Cass.
Hemiachyris, DC.	Demetria, Legase.	

* * Pappus of the disk different from that of the ray.

GENERA AND SYNONYMES.

Heterotheca.	Bradburia, Torrey.	„ Sideranthus, Nutt.
Calycium, Ell.	Dieteria, Nutt.	Pappochroma, Nutt.
Diplocoma, Don.		

* * * Pappus hairy, alike in form, generally in one series.

GENERA AND SYNONYMES.

Erato, DC.	„ Elphegea, Cass.	Glutinaria, Comm.	Nidorella, Cass.
Woodvillea, DC.	Thouarsia, Vent.	Frivaldia, Endl.	Homochroma, DC.
Psiadia, Jacq.	Alix, Comm.	Microglossa, DC.	Neja, D. Don.

* * * Pappus double; outer series short, somewhat chaffy; the inner hairy.

GENERA AND SYNONYME.

Chrysopsis, Nutt.	Pityopsis, Nutt.
Diplogon, Raf.	Fresenia, DC.

* * * Pappus of the disk and of the ray similar in form, hairy, and in one series.

GENERA AND SYNONYMES.

Bigelovia, DC.	Chrysoma, Nutt.	Ericameria, Nutt.	Ammodia, Nutt.
Solidago, L.	Commidendrum Bch.	Pyrrocoma, Hook.	Eriocarpum, Nutt.
Virga-aurea, T.	Steiraetis, DC.	Chromochaeta DC	Pteronia, L.
Doria, Ad.	Rochonia, DC.	Lessingia, Cham.	Henanthus, Less.
Amphirapis, DC.	Haplopappus, Cass.	Macrocnema, Nutt.	Seepinia, DC.
Stenotus, Nutt.	Aplopappus, Cass.	Isocoma, Nutt.	Paehyderris, DC.
Homopappus, Nutt.	Diplopappus, Less.	Linosyris, Lobel.	Pterophorus, DC.
Myrianthus, Nutt.	? Hoorebeekia Crn.	Crinitaria, Less.	Pterophora, Neck.
Actinophora Nutt.	? Sideranthus Fras.	Crinita, Mün.	Brachyaetis, Led.
Isopappus, Torrey.	Chrysothamnus Nutt.	Chrysocoma, Cass.	Brachychaeta, Torr.

DIV. 4. *Solenogyneae*.—Heads without rays (discoid), with all the flowers tubular, the exterior ones pistillate.

GENERA.

Duhaldea, DC.	Nolletia, Cass.	Leptothamnus, DC.
Microtrichia, DC.	Sarcanthemum, Cass.	Solenogyne, Cass.

SUB-TRIBE 2. *BACCHARIDÆ*.—Heads without rays; the flowers all tubular, diœcious, or monœcious; the corolla of the pistillate flowers very slender, thread-like, and truncate; those of the staminate five-toothed. Anthers without tails at the base. Receptacle naked. Leaves alternate.

DIV. 1. *Conyzinæ*.—Heads heterogamous, monœcious.

* Heads collected into a round glomerule, sessile in the axils of the bracts.

GENERA AND SYNONYME.

Blepharispermum,	Athroisma, DC.	Sphaeranthus, Vail.
[Wight.]	Leucoblepharis, Arn.	Oligolepis, Cass.

** Heads not collected into a glomerule. Pappus entirely or nearly wanting.

GENERA AND SYNONYMS.

Dichrocephala, DC.	Grangea, Ad.	Lestadia, Kunth.	„ Gymnarhea Steud.
Centipeda, Less.	Cyathocline, Cass.	Gymnarrhena, Desf.	Frankia, Steud.

* * Heads not collected into a glomerule. Pappus hairy, in one or two series.

GENERA AND SYNONYMS.

Thespis, DC.	Conyza, Less.	Leucopodium,	Chionolœna, DC.
Karelinia, Less.	Eschenbachia,	[Gardn.]	Elæothamnus, DC.
Berthelotia, DC.	[Mön.]	Phagnalon, Cass.	Parastrephia, Nutt.
Liennecia, Cass.			

DIV. 2. *Baccharineæ*.—Heads diœcious.

GENERA AND SYNONYMS.

Polypappus, Less.	„ Sergillus, Gärt.	„ Arrhenachne,	Stephananthus,
Baccharis, L.	Pingræa, Cass.	[Cass.]	[Lehm.]
Molina, R. & P.	Tursenia, Cass.		Hymenopholis, Grd

SUB-TRIBE 3. *TARCHONANTHIDÆ*.—Heads without rays, either diœcious or heterogamous. The exterior florets pistillate, in several series, and very slender; those of the disk hermaphrodite or staminate. Anthers with tails at the base. Leaves alternate.

DIV. 1. *Tarchonanthineæ*.—Heads diœcious.

GENERA AND SYNONYMS.

Brachylœna, R. Br.	Tarchonanthus, L.	Anthocerastes, A. Gr.
Oligocarpha, Cass.	Scyphocoronis, A. Gr.	

DIV. 2. *Pluchineæ*.—Heads heterogamous or monœcious.

GENERA AND SYNONYMS.

Blumca, DC.	Monanteles, Lab.	Lepidopogon,	Micropsis, DC.
Erigeron, Don.	Tessaria, R. & P.	[Tausch.]	Micropus, L.
Pluchea, Cass.	Gynheteria, W.	Evax, Gärt.	Gnaphalodes, T.
Stylimnus, Raf.	Gyneteria, Sp.	Filago, W.	Psilocarpa, Nutt.
Gymnema, Raf.	? Phalacrocesum,	Gnaphalium,	Calymnandra, Torr.
Leptogyne, Ell.	[Sp.]	[Vaill.]	Epaltes, Cass.
Chlenobolus, Cass.	Monarrhenus, Cass.	Filaginopsis, Torr.	Ethulia, Gärt.
? Placus, Lour.	Mahometa, DC.	Diaperia, Nutt.	Denekia, Th.
Pterocaulon, Ell.	Cylindrocline, Cass.	Stylocline, Nutt.	Dipterocome, F. & M.
Chlenobolus, Cass.			Gnaphalodes, A. Gr.

SUB-TRIBE 4. *INULIDÆ*.—Heads with rays, heterogamous—that is, the pistillate flowers almost always strap-shaped; never diœcious, rarely homogamous or discoid. Receptacle naked. Anthers with tails at the base. Leaves alternate.

DIV. 1. *Inulineæ*.—Heads many-flowered, not collected into a glomerule.

GENERA AND SYNONYMES.

Rhanterium, Desf.	Vicoa, Cass.	Vicraea, Webb.	Zeyheria, Sp.
Codonocephalum,	Pentanema, Cass.	Pulicaria, Gart.	Dizonium, W.
[Fenzl.	Francœuria, Cass.	Strabonia, DC.	Hochstetteria, DC.
Inula, Gärt.	Duchesnia, Cass.	Pegolettia, Cass.	Inulaster, C.H.Sch.
Euula, Duby.	Asteridea, Lindl.	Minyrothamnus DC	Pterochaete, Boiss.
Eritheis, A. Gr.	Iphiaona, DC.	Clypselodontia, DC.	Grantia, Boiss.
Schinogyne, Cass.	Jasonia, Cass.	Geigeria, Griess.	Leucactis, Edgw.
Varthemia, DC.	Myriadenus, Cass.		

DIV. 2. *Cæsulineæ*.—Heads one-flowered, collected into a glomerule. Involucre two-valved, becoming at length united with the seed-nut.

GENUS AND SYNONYME.

Cæsulia, Roxb.
Meyera, Sp. Don.

SUB-TRIBE 5. BUPHTHALMIDÆ.—Heads with rays; the florets various, (*heterogamous*), or rarely uniform (*homogamous*). Florets of the ray pistillate, strap-shaped, rarely tubular. Anthers either with or without tails at the base. Receptacle chaffy. Pappus in the form of a circlet, either divided or toothed. Leaves alternate.

GENERA AND SYNONYMES.

Bupthalmum, Neck.	Asteriscus, Mön.	Athalmum, Neck.	Ceruana, Forsk.
Telekia, Baumg.	Nauplius, Cass.	Anvillea, DC.	Cryptadia, Lindl.
Molpadia, Cass.	Pallenis, Cass.		

SUB-TRIBE 6. ECLIPTIDÆ.—Heads with rays. Florets various (*heterogamous*); those of the ray pistillate and strap-shaped, and those of the disk hermaphrodite. Anthers without tails at the base. Receptacle chaffy. Pappus wanting, or, if present, awned, never bristly. Leaves opposite.

GENERA AND SYNONYMES.

Borrichia, Ad.	Blainvillea, Cass.	Leptocarpha, DC.
Diomedea, Cass.	Ueacca, Cass.	Siegesbeckia, L.
? Odontospermum, Neck.	Salmca, DC.	Schkuhria, Mön.
Eclipta, L.	Hopkirkia, Sp.	Sabazia, Cass.
Micrelum, Forsk.	Dahlia, Cav.	Cryphiospermum, Palis.
Eupatoriophalacron,	Georgina, W.	Wahlenbergia, Schum.
[Vail.	Georgia, Sp.	Limnogneton, C.H.Sch.

TRIBE 4. *Senecioneæ*.—Style cylindrical, with the arms linear, hairy, or pencil-tufted at the apex, where the stigmatic lines terminate abruptly; sometimes truncate, sometimes elongated beyond the fringe into a short cone, or more or less hairy appendage, Fig. 4.

SUB-TRIBE 1. MELAMPODIDÆ.—Flowers all unisexual, not any hermaphrodite; staminate and pistillate in different plants (*diœcious*), or in different heads of the same plants (*heterocephalous*), or in the same heads (*monœcious*). Anthers without tails at the base. Receptacle generally chaffy. Pappus generally wanting, never bristly.

Div. 1. *Euxenineæ*.—Heads staminate and pistillate in different plants (dioecious); many-flowered; discoid. Chaff of the receptacle not concrete with the seed-nuts.

GENERA AND SYNONYMES.

<i>Euxenia</i> , <i>Cham.</i>	<i>Petrobium</i> , <i>R. Br.</i>	<i>Drymiphyllum</i> , <i>Burch.</i>
<i>Ogiera</i> , <i>Sp.</i>	<i>Laxmannia</i> , <i>Forst.</i>	<i>Astemna</i> , <i>Less.</i>
<i>Podanthus</i> , <i>R. Br.</i>		

Div. 2. *Millerineæ*.—Heads few-flowered, monœcious, that is; some of the florets of the ray pistillate, strap-shaped, or tubular and trifid; the centre ones tubular and staminate. Receptacle frequently naked; the chaff not concrete with the seed-nuts.

GENERA AND SYNONYMES.

<i>Elvira</i> , <i>DC.</i>	<i>Latreillea</i> , <i>DC.</i>	<i>Unxia</i> , <i>L.</i>	<i>Xenismia</i> , <i>DC.</i>
<i>Meratia</i> , <i>Cass.</i>	<i>Garcilassa</i> , <i>Pöpp.</i>	<i>Blennosperma</i> , <i>Less.</i>	<i>Seolospermum</i> , <i>Less.</i>
<i>Delilia</i> , <i>Sp.</i>	<i>Ichthyothere</i> , <i>Mart.</i>	<i>Apalus</i> , <i>DC.</i>	<i>Baltimora</i> , <i>L.</i>
<i>Eugamelia</i> , <i>M. & S.</i>	<i>Clibadium</i> , <i>L.</i>	<i>Pronaeron</i> , <i>Cass.</i>	<i>Fougerouxia</i> , <i>DC.</i>
<i>Milleria</i> , <i>Cass.</i>	<i>Baillieria</i> , <i>Less.</i>	<i>Aiolotheca</i> , <i>DC.</i>	<i>Niebulhria</i> , <i>Scop.</i>
<i>Riencourtia</i> , <i>Cass.</i>	<i>Trixis</i> , <i>Swartz.</i>	<i>Trigonospermum</i> , [<i>Less.</i>]	<i>Fougeria</i> , <i>Mön.</i>
<i>Tetrantha</i> , <i>Poit.</i>	<i>Picrothamnus</i> , <i>Nut.</i>		<i>Chrysogonum</i> , <i>L.</i>

Div. 3. *Silphineæ*.—Heads many-flowered, monœcious; pistillate florets numerous, strap-shaped. Seed-nuts naked, or two-awned. Receptacle chaffy; the chaff or scales never concrete with the seed-nuts.

GENERA AND SYNONYMES.

<i>Guardiola</i> , <i>H. B.</i>	<i>Polymnia</i> , <i>L.</i>	<i>Berlandiera</i> , <i>DC.</i>
<i>Guandiola</i> , <i>Ste.</i>	<i>Alymnia</i> , <i>Neck.</i>	<i>Angelandra</i> , <i>Endl.</i>
<i>Hidalgoa</i> , <i>Less.</i>	<i>Polymniastrium</i> , <i>Lam.</i>	<i>Engelmannia</i> , <i>Torrey.</i>
<i>Silphium</i> , <i>L.</i>	<i>Espeletia</i> , <i>Mut.</i>	<i>Lindheimera</i> , <i>A. Gr.</i>

Div. 4. *Melampodineæ*.—Heads radiate, many-flowered, monœcious, with numerous pistillate, strap-shaped florets. Seed-nuts having the chaff of the receptacle concrete with them.

GENERA AND SYNONYMES.

<i>Melampodium</i> , <i>L.</i>	? <i>Hidalgoa</i> , <i>LL. & L.</i>	<i>Echinodium</i> , <i>Poir.</i>
<i>Dysodium</i> , <i>L. C. R.</i>	<i>Acanthospermum</i> , <i>Schrnk.</i>	<i>Diotosperma</i> , <i>A. Gr.</i>
<i>Camatia</i> , <i>Bonat.</i>	<i>Centrospermum</i> , <i>Kunth.</i>	

Div. 5. *Ambrosineæ*.—Heads staminate and pistillate on the same plant. Involucre of the staminate florets monophyllous, many-flowered; in the pistillate, one or few-flowered. Corollas tubular, shortly five-toothed; in the pistillate, florets sometimes wanting. Anthers without tails at the base, approximate, not truly concrete. Seed-nuts naked.

GENERA AND SYNONYMES.

<i>Xanthium</i> , <i>T.</i>	<i>Centrolena</i> , <i>DC.</i>
<i>Frauseria</i> , <i>Cav.</i>	<i>Ambrosia</i> , <i>T.</i>
<i>Xanthiopsis</i> , <i>DC.</i>	

DIV. 6. *Ivineæ*.—Florets male and female in the same heads (monœcious). Corollas all tubular, five-toothed, sometimes wanting in the female. In the male, anthers free; styles thickened at the apex. In the female, the styles are bipartite, or simply elongate, almost awl-shaped, hairy.

GENERA AND SYNONYMES.

Pinillosia, <i>Ossa</i> .	Denira, <i>Ad</i> .	Euphrosinia, <i>Rehb</i> .
Tetranthus, <i>Swartz</i> .	Euphrosyne, <i>DC</i> .	Gymnogyne, <i>Steetz</i> .
Iva, <i>L</i> .	? Cyclachæna, <i>Fresen</i> .	Parthenice, <i>A. Gr</i> .

DIV. 7. *Parthenineæ*.—Flowers male and female in the same heads, radiate. Florets of the ray in one series pistillate, strap-shaped, persistent, or slowly deciduous; florets of the disk staminate, tubular, five-toothed. Receptacle frequently chaffy. Seed-nuts somewhat compressed, girded with a callous margin, or rarely three-sided.

GENERA AND SYNONYMES.

Coniothele, <i>DC</i> .	„ Hysterophorus, <i>Vaill</i>	Villanova, <i>Orteg</i> .
Leptosyne, <i>DC</i> .	Trichospermum, <i>Palis</i> .	Mendezia, <i>DC</i> .
Parthenium, <i>L</i> .	Bolophyta, <i>Nutt</i> .	Tragoceras, <i>Less</i> .
Partheniastrum, <i>Nissol</i> .	Argyrochæta, <i>Cav</i> .	Moonia, <i>Arnott</i> .

SUB-TRIBE 2. HELIANTHIDÆ.—*Heads radiate, generally heterogamous; florets of the ray strap-shaped or pistillate, those of the disk hermaphrodite. The heads are rarely homogamous and discoid, never monœcious or dioecious. Receptacle chaffy, or rarely somewhat naked at the centre. Seed-nuts sometimes cylindrical or compressed. Pappus either wanting or like a crown, or awned, never hairy, or of uniform chaffy scales. Anthers blackish, not tailed at the base.*

DIV. 1. *Heliopsidineæ*.—Heads heterogamous, flowers of the ray pistillate. Seed-nuts frequently with a thick skin, obovate, angular, or compressed, never ob-compressed; naked, or with pappus in the form of a crown, or a few stiff hairs irregularly coronate.

GENERA AND SYNONYMES.

Philaetis, <i>Schrad</i> .	? Trichostemma,	Monaetis, <i>H. B. K.</i>	Tetragonotheca, <i>Dill</i> .
Zinnia, <i>L</i> .	[<i>Cass</i>	Wollastonia, <i>DC</i> .	Halea, <i>T. & G</i> .
Lejcia, <i>Hill</i> .	Niebuhrria, <i>Neck</i> .	Tilesia, <i>F. W. M</i> .	Engelmannia,
Crassina, <i>Scop</i> .	Trichostephus, <i>Css</i> .	Pascalina, <i>Orteg</i> .	[<i>Torrey</i> .
Helicta, <i>Cass</i> .	Aglossa, <i>DC</i> .	Rumfordia, <i>DC</i> .	Ferdinanda, <i>Lag</i> .
Alargonia, <i>DC</i> .	Jæigeria, <i>H. B. K</i> .	Heliopsis, <i>Pers</i> .	Chrysophania, <i>Kth</i> .
Wyethia, <i>Nutt</i> .	Lipotriche, <i>R. Br</i> .	? Helepta, <i>Raf</i> .	Zaluzania, <i>Pers</i> .
Trachinga, <i>Engl</i> .	Melanthera, <i>Rohr</i> .	Guizotia, <i>Cass</i> .	Chiliophyllum, <i>DC</i> .
Wedelia, <i>Jacq</i> .	Ogiera, <i>Cass</i> .	Rantilla, <i>DC</i> .	Hybridella, <i>Cass</i> .
Stemodontia, <i>Css</i>	Chalarium, <i>Poit</i> .	Veslingia, <i>Viz</i> .	Scalesia, <i>Arnott</i> .

DIV. 2. *Rudbekineæ*.—Heads heterogamous. Semi-florets of the ray neuter or style-bearing; sterile. Seed-nuts not beaked, naked, or crowned with crown-like pappus.

GENERA AND SYNONYMES.

Echinacea, <i>Mön.</i>	Obeliscaria, <i>Cass.</i>	? Aldama, <i>Ll. & L.</i>	Eriocarpa, <i>Cass.</i>
Branneria, <i>Neek.</i>	Lepachys, <i>Less.</i>	Wulfia, <i>Neek.</i>	Pristleya, <i>Fl. Mex.</i>
Bobartia, <i>Petiv.</i>	Ratibida, <i>Raf.</i>	Chakiatella, <i>Cass.</i>	Sclerocarpus, <i>Jaeg.</i>
Helichroa, <i>Raf.</i>	Monodonta, <i>DC.</i>	Chilodia, <i>Rich.</i>	Encelia, <i>Ad.</i>
Echinomeria, <i>Nutt.</i>	Andrieuxia, <i>DC.</i>	Gymnolomia, <i>Ker.</i>	Pallasia, <i>Herit.</i>
Rudbeckia, <i>L.</i>	Anomostephium,	Crodosperma,	Philoglossa, <i>DC.</i>
Obeliscotheca,	[<i>DC.</i>	[<i>Poit</i>	Chrysostemma, <i>Les.</i>
[<i>Vaill.</i>	Aspilia, <i>Thouars.</i>	Montagnæa, <i>DC.</i>	Calliopsis, <i>Rehb.</i>
Heliophthalmum	Gymnopsis, <i>DC.</i>	Eriocoma, <i>Kunth.</i>	Diplosastra, <i>Tau.</i>
[<i>Raf.</i>	Gymnolomia,	Montanoa, <i>Ll. & L.</i>	? Peramibus, <i>Raf.</i>
Dracopis, <i>Cass.</i>	[<i>Kuth.</i>		

DIV. 3. *Coreopsineæ*.—Heads heterogamous. Semi-florets of the ray neuter. Seed-nuts not beaked. Pappus sometimes with two to four awns, and sometimes also with stiff scales.

GENERA AND SYNONYMES.

Agarista, <i>DC.</i>	Medusca, <i>Nutt.</i>	Armania, <i>Berter.</i>	Vocasan, <i>Ad.</i>
Epilepsis, <i>Benth.</i>	Heterodonta,	Oyedæa, <i>DC.</i>	Discomela, <i>Raf.</i>
Corcopsis, <i>L.</i>	[<i>Nutt.</i>	Senisia, <i>Pers.</i>	Flourensia, <i>DC.</i>
Coreopsoides <i>Mön.</i>	Tuckermannia,	Viguiera, <i>H. B. K.</i>	Wurmschmidtia,
Acispermum,	[<i>Nutt.</i>	Leighia, <i>Cass.</i>	[<i>C. H. Sch.</i>
[<i>Neek.</i>	Actinomeris, <i>Nutt.</i>	Harpalium, <i>Cass.</i>	Stippia, <i>C. H. Sch.</i>
Leechea, <i>Cass.</i>	Ridan, <i>Ad.</i>	Tithonia, <i>Desf.</i>	Echinocephalum,
Chrysomelea,	Pterophyton,	Helianthus, <i>L.</i>	[<i>Gardn.</i>
[<i>Tausch.</i>	[<i>Cass.</i>	Chrysis, <i>Reveal.</i>	Serpæa, <i>Gardn.</i>
Diodonta, <i>Nutt.</i>	Actimeris, <i>Raf.</i>	Corona Solis, <i>T.</i>	Uhdea, <i>Kth.</i>

DIV. 4. *Bidentineæ*.—Heads heterogamous, with semi-florets of the ray neuter; rarely homogamous, discoid. Seed-nuts beaked at the apex, generally with one to four stiff awns, which are hooked downwards.

GENERA AND SYNONYMES.

Campylotheca, <i>Cass.</i>	Edwardsia, <i>Neek.</i>	Cosmea, <i>W.</i>
Bidens, <i>L.</i>	Ceratocephalus, <i>Vaill.</i>	Adenolepis, <i>Less.</i>
Kerneria, <i>Mön.</i>	Cosmos, <i>Cav.</i>	Microdonta, <i>Nutt.</i>
Pluridens, <i>Neek.</i>		

DIV. 4. *Verbesineæ*.—Heads various (heterogamous), with the semi-florets of the ray pistillate; rarely alike (homogamous), discoid. Seed-nuts compressed or ob-compressed, either naked, or with awns, or stiff, brittle hairs.

GENERA AND SYNONYMES.

Lasianthea, <i>DC.</i>	Lipochæta, <i>DC.</i>	Schizophyllum,	„ Siegesbeckia,
Lasianthus, <i>Zucc.</i>	Lipotriche, <i>Less.</i>	[<i>Nutt.</i>	[<i>Gron.</i>
Perymenium,	? Zexmenia,	Diplothrix, <i>DC.</i>	Phætusa, <i>Gärt.</i>
[<i>Schrad.</i>	[<i>Ll. & L.</i>	Selloa, <i>H. B. K.</i>	Hamulium, <i>DC.</i>
Schistocarpa,	Microchæta, <i>Nutt.</i>	Fæae, <i>Sp.</i>	Platypterus, <i>DC.</i>
[<i>Less.</i>	Aphanopappus,	Verbesina, <i>Less.</i>	Prestinaria,
Psathurochæta, <i>DC.</i>	[<i>Endl.</i>	Locheria, <i>Neek.</i>	[<i>C. H. S.</i>

Acoma, <i>Benth.</i>	Dunantia, <i>DC.</i>	Chromolepis, <i>Benth.</i>	Heterosperma, [Cav.]
Coreocarpus, <i>Benth.</i>	Ximenesia, <i>Cav.</i>	Chrysanthellum, [Rich.]	Glossogyne, <i>Cass.</i>
Mendezia, <i>DC.</i>	Sanvitalia, <i>Juss.</i>	Chrysanthellina, [Cass.]	Delucia, <i>DC.</i>
Ditrichum, <i>Cass.</i>	Lorentea, <i>Orteg.</i>	Sebastiania, <i>Bert.</i>	Narvalina, <i>Cass.</i>
Mieractis, <i>DC.</i>	Anaitis, <i>DC.</i>	Collaea, <i>Sp.</i>	Needhamia, <i>Less.</i>
Spilanthes, <i>DC.</i>	Oligogyne, <i>DC.</i>	Neuraetis, <i>Cass.</i>	Thelesperma, <i>Less.</i>
Ceruchis, <i>Gärt.</i>	Harpephora, <i>Endl.</i>	Glossocardia, <i>Cass.</i>	Cosmidium, <i>T & G</i>
Acmella, <i>DC.</i>	Synedrella, <i>Gärt.</i>	Heterospermum, <i>W</i>	Isostigma, <i>Less.</i>
Pyrethrum, <i>Med.</i>	Calyptracarpus, [Less.]		Prionolepis, <i>Pöpp.</i>
Athronia, <i>Neck.</i>	Electra, <i>DC.</i>		
Salivaria, <i>DC.</i>			

SUB-TRIBE 3. FLAVERIDÆ.—Heads sometimes one or few-flowered, densely aggregate; some heterogamous, with one pistillate floret, and the rest hermaphrodite; others intermixed, homogamous, sometimes many-flowered, with the female florets in many series, the rest hermaphrodite. Seed-nuts naked. Receptacle in the few-flowered heads naked, in the many-flowered chaffy. Leaves opposite.

GENERA AND SYNONYMES.

Flaveria, <i>Juss.</i>	Nauenburgia, <i>W.</i>	„ Sobrya, <i>Pers.</i>
Vermifuga, <i>R. & P.</i>	Enhydra, <i>Lour.</i>	Hengeha, <i>Roxb.</i>
Broteroa, <i>DC.</i>	Meyera, <i>Schreb.</i>	Tetractis, <i>Reinw.</i>
Brotera, <i>Sp.</i>		

SUB-TRIBE 4. TAGETIDÆ.—Heads many-flowered, sometimes heterogamous, with the florets of the ray almost always strap-shaped, sometimes homogamous, discoid. Involucre either in one series, with more or less concrete scales, or in many series, with the exterior scales in the form of bracts and free, the interior concrete. Receptacle flat and naked. Seed-nuts not beaked, striated, elongated, attenuated at the base. Pappus with stiff bristles, scales, or hairs. Herbs or under-shrubs, frequently annuals, natives of America, with large pellucid glands in the substance of the leaves and involucre, and therefore often fragrant. Leaves opposite or alternate.

DIV. 1. Tagetincæ.—Heads generally heterogamous, radiate. Interior scales of the involucre concrete. Corolla of the disk regularly five-toothed. Arms of the styles terminating in the form of a cone. Pappus unequal, in one or two series of stiff bristles or scales.

GENERA AND SYNONYMES.

Adenophyllum <i>Pers.</i>	Dysodia, <i>Cav.</i>	Hymenatherum, [Cass.]	Diglossus, <i>Cass.</i>
Willdenova, <i>Cav.</i>	Berbera, <i>W.</i>	Gnaphalopsis, <i>DC.</i>	Enaleida, <i>Cass.</i>
Schlechtendalia, [W.]	Gymnolena, <i>DC.</i>	Riddellia, <i>Nutt.</i>	Thymophylla, <i>Lag.</i>
Lebetina, <i>Cass.</i>	Aciphylla, <i>DC.</i>	Solenotheca, <i>Nutt.</i>	Adenopappus, <i>Benth.</i>
Berbera, <i>Less.</i>	Clomenocoma, <i>Cass.</i>	Tagetes, <i>T.</i>	Synecephalanthia, [Bartl.]
Dissodia, <i>W.</i>	Bartolina, <i>Ad.</i>		Comaclinium, <i>Schd.</i>

DIV. 2. Porophyllincæ.—Heads always homogamous, discoid. Scales of the involucre free or scarcely concrete at the base. Corollas of the disk

unequally divided, sublunate. Arms of the styles prolonged in the form of an awl-shaped appendage. Pappus bristly, in many series.

GENERA AND SYNONYMES.

Porophyllum, <i>Willd.</i>	„, Tsinoma, <i>Hern.</i>	„, Cusimbua, <i>DC.</i>	Chæthymenia, <i>H. & A.</i>
Kleinia, <i>Jacq.</i>	Hunteria, <i>Fl. Mex.</i>	Kugaina, <i>DC.</i>	

SUB-TRIBE 5. HELENIDÆ.—Heads generally heterogamous, with the florets of the ray strap-shaped (rarely tubular), pistillate or neuter in one series, the rest hermaphrodite, rarely homogamous, never dioecious. Anthers often blackish, somewhat prolonged at the base, not tailed. Arms of the style sometimes truncate at the apex, sometimes in the form of a cone. Seed-nuts not beaked. Pappus with several distinct chaffy scales in one series, rarely naked by abortion. Scales of the involucre numerous, distinct. Leaves generally alternate, sometimes opposite. Mostly natives of America.

DIV. 1. *Gaillardineæ*.—Pappus membranaceous, almost always entire. Receptacle naked, either honeycombed (areolate) or fimbriate.

* *Semi-florets neuter.*

GENERA AND SYNONYMES.

Gaillardia, <i>Foug.</i>	Galordia, <i>Reus.</i>	Leptopoda, <i>Nutt.</i>	Lepidostephanus,
Galardia, <i>Lam.</i>	Balduina, <i>Nutt.</i>	Leptocarpha, <i>Raf.</i>	[<i>Barth.</i>
Colonnea, <i>Buch.</i>	Endorima, <i>Itaf.</i>	Achyraachena,	Agassizia, <i>A. Gr.</i>
Virgilia, <i>Herit.</i>	Actinospermum, <i>Ell.</i>	[<i>Schauer.</i>	

** *Semi-florets pistillate or wanting.*

GENERA AND SYNONYMES.

Gutierrezia, <i>Lag.</i>	Phialis, <i>Sp.</i>	Stylesia, <i>Nutt.</i>	Mesodetra, <i>Raf.</i>
Achyropappus, <i>H.</i>	Richteria, <i>Karel.</i>	Cephalophora, <i>Cav.</i>	Amblyolepis, <i>DC.</i>
[<i>B. K.</i>	Oxylepis, <i>Benth.</i>	Gramia, <i>Hook.</i>	Rosilla, <i>Less.</i>
Chamæstephan-	Macrocephalus, <i>Nutt.</i>	Actinella, <i>DC.</i>	Trichinettia, <i>Endl.</i>
[<i>um, W.</i>	Macrocarphus,	Actinea, <i>Juss.</i>	Schomburgkia,
Schkuhria, <i>Roth.</i>	[<i>Nutt.</i>	Dugaldea, <i>Cass.</i>	[<i>DC.</i>
Tetracarpum, <i>Mön.</i>	Hymenopappus,	Ptilepida, <i>Raf.</i>	Hecubæa, <i>DC.</i>
Micria, <i>Ll. & L.</i>	[<i>Herit.</i>	Cancerinia, <i>Karel.</i>	Bæria, <i>F. & M.</i>
Amblyopappus, <i>Hk.</i>	Rothia, <i>Lam.</i>	Jaumea, <i>Pers.</i>	Callichra, <i>F. & M.</i>
Florestina, <i>Cass.</i>	Chænactis, <i>DC.</i>	Kleinia, <i>Juss.</i>	Calliachyris, <i>T. & G.</i>
Lepidopappus,	Polypteris, <i>Nutt.</i>	Burrielia, <i>DC.</i>	Oxypappus, <i>Benth.</i>
[<i>Fl. Mex.</i>	Espejoa, <i>DC.</i>	Ptilomeris, <i>Nutt.</i>	Rancagua, <i>Pöpp.</i>
Actinolepis, <i>DC.</i>	Cercostylus, <i>Less.</i>	Dichæta, <i>Nutt.</i>	Lasthenia, <i>Cass.</i>
Bahia, <i>DC.</i>	Polypteris, <i>Less.</i>	Pieradenia, <i>Hook.</i>	Argyroxiphium, <i>DC.</i>
Eriophyllum, <i>Lag.</i>	Güntheria, <i>Sp.</i>	Helenium, <i>L.</i>	Argyrophyton, <i>Hk.</i>
Trichophyllum,	Hopkirkia, <i>DC.</i>	Brassavola, <i>Ad.</i>	Pleurophyllum,
[<i>Nutt.</i>	Hymenoxis, <i>Cass.</i>	Tetradus, <i>DC.</i>	[<i>Hook. f.</i>

DIV. 2. *Galenogineæ*.—Pappus in one series, with entire or feathery stiff scales, rarely wanting. Receptacle scaly. Scales of the involucre not involved with the seed-nuts of the ray.

* *Semi-florets pistillate or wanting; scales of the pappus not contorted in aestivation.*

GENERA AND SYNONYMES.

Lemmatium, <i>DC.</i>	Leontophthal-	Sogalgina, <i>Cass.</i>	Eriopappus, <i>Arn.</i>
Caleacte, <i>Less.</i>	[mum, <i>Less.</i>	Galinsogea, <i>Less.</i>	Marschallia, <i>Schrb.</i>
Calidermos, <i>Lag.</i>	Amphicalea, <i>Gard.</i>	Sogaligna, <i>Steud.</i>	Persoonia, <i>Mx.</i>
Calebrachys, <i>DC.</i>	Allocarpus, <i>H. B. K.</i>	Ptilostephium, <i>H.</i>	Trattinickia, <i>Pers</i>
Meyeria, <i>DC.</i>	Alloispermum, <i>W</i>	[B. K.	Athanasia, <i>Walt.</i>
Callilepis, <i>DC.</i>	Vargasia, <i>DC.</i>	Tridax, <i>L.</i>	Phyteumopsis,
Calea, <i>R. Br.</i>	Galinsoga, <i>R. & P.</i>	Blepharipappus, <i>Hk</i>	[<i>Juss.</i>
Caleacte, <i>DC.</i>	Galinsogea, <i>Zucc.</i>	Ptilonella, <i>Nutt.</i>	Dubautia, <i>Gaud.</i>
Moginna, <i>Lag.</i>	Wiborgia, <i>Roth.</i>		

** *Semi-florets neuter.* Chaff of the pappus obovate obtuse, rolled up in the form of contorted corollas.

GENERA AND SYNONYMES.

Sphenogyne, <i>R. Br.</i>	Thelythamnos, <i>Less.</i>	Amda, <i>Nutt.</i>
Oligacirion, <i>Cass.</i>	Xerolepis, <i>DC.</i>	Lagophylla, <i>Nutt.</i>
Spermophylla, <i>Neck.</i>	Ursinia, <i>Gärt.</i>	Harpæcarpus, <i>Nutt.</i>

DIV. 3. *Madineæ*.—Receptacle almost wholly chaffy, or only so at the margin. Scales of the involuere in one or two series, convolute or complicate, enclosing the seed-nuts of the ray, which are always naked. Seed-nuts of the disk either with a chaffy pappus or naked, fertile or sterile. Leaves alternate; flowers yellow.

GENERA AND SYNONYMES.

Madia, <i>Molin.</i>	Madriopsis, <i>Nutt.</i>	Madaroglossa, <i>DC.</i>	Anisocarpus, <i>Nutt.</i>
Biotia, <i>Cass.</i>	Tollatia, <i>Endl.</i>	Layia, <i>H. & Arn.</i>	Osmadenia, <i>Nutt.</i>
Silphiosperma,	Oxyura, <i>DC.</i>	Lepidostephanus,	Calycadenia, <i>DC.</i>
[<i>Steetz.</i>	Hartmannia, <i>DC.</i>	[<i>Bartl.</i>	
Madaria, <i>DC.</i>	Hemizonia, <i>DC.</i>	Amauria, <i>Benth.</i>	

SUB-TRIBE 6. *ANTHEMIDÆ*.—Heads rarely homogamous, almost always heterogamous, never diœcious. Florets of the ray in one or in many series, pistillate or rarely neuter, strap-shaped, tubular, or hence bilabiate; florets of the disk tubular, four or five-toothed, hermaphrodite or rarely staminate. Anthers not tailed at the base. Arms of the style bearded or truncate at the apex, sometimes prolonged into a cone. Pappus wanting or small, and coronet-shaped, or rarely ear-shaped. Leaves generally alternate.

DIV. 1. *Anthemineæ*.—Heads radiate, rarely discoid. Semi-florets in one series, pistillate or rarely neuter; florets of the disk hermaphrodite. Receptacle chaffy.

GENERA AND SYNONYMES.

Ederia, <i>DC.</i>	Chamæmelum,	Cyrtolepis, <i>Less.</i>	Gnaphalium, <i>T.</i>
Edera, <i>L.</i>	[<i>DC.</i>	Ormenis, <i>Cass.</i>	Otanthus, <i>Link.</i>
Eumorphia, <i>DC.</i>	Maruta, <i>Cass.</i>	Cladanthus, <i>Cass.</i>	Santolina, <i>T.</i>
Aganippea, <i>DC.</i>	Periderrea, <i>Webb.</i>	Lepidophorum, <i>Neck</i>	Nablonium, <i>Cass.</i>
Heliogenes, <i>Benth</i>	Lugoa, <i>DC.</i>	Ptarmica, <i>T.</i>	Lasiospermum, <i>Lag</i>
Epallage, <i>DC.</i>	Lyonettia, <i>Cass.</i>	Achillea, <i>Neck.</i>	Lanipila, <i>DC.</i>
Anthemis, <i>DC.</i>	Anacyclus, <i>Pers.</i>	Diotis, <i>Desf.</i>	Mataxa, <i>Sp.</i>
Marcelia, <i>Cass.</i>	Hiorthia, <i>Neck.</i>		

Div. 2. *Chrysanthemineæ*.—Receptacle naked. Heads radiate, with the semi-florets in one series, pistillate, rarely neuter; those of the disk hermaphrodite.

GENERA AND SYNONYMES.

Steiroglossa, <i>DC.</i>	Hisutsua, <i>DC.</i>	Gymnocline, <i>Cass</i>	Argyranthemum,
Lidbeckia, <i>Berg.</i>	Braclanthemum,	Coleostephus <i>Cass</i>	[<i>Webb.</i>
Gamolepis, <i>Less.</i>	[<i>DC.</i>	Allardia, <i>Decaisne.</i>	Dimorphothea,
Lasthenia, <i>DC.</i>	Nananthea, <i>DC.</i>	Chrysanthemum,	[<i>Vaill.</i>
Hologymne, <i>Brill.</i>	Leucanthemum, <i>T.</i>	[<i>DC.</i>	Gattenhofia, <i>Neck</i>
Psilothamnus, <i>DC.</i>	Chrysanthemum,	Ismelia, <i>Cass.</i>	Cardispermum,
Jacquemontia,	[<i>Less.</i>	Pinardia, <i>Cass.</i>	[<i>Traut.</i>
[<i>Belang.</i>	Phallacrodiscus,	Glebionis, <i>Cass.</i>	Acanthotheca, <i>DC.</i>
Spiridanthus, <i>Fenz.</i>	[<i>Less</i>	Centrospermum,	Monolopia, <i>DC.</i>
Coinogyne, <i>Less.</i>	Phallacroglossum	[<i>Sp.</i>	Steirodiscus, <i>Less.</i>
Egletes, <i>Less.</i>	[<i>DC.</i>	Heteranthemis,	Schistostephium,
Xerobius, <i>Cass.</i>	Diaphasis, <i>DC.</i>	[<i>Schott.</i>	[<i>Krebs.</i>
Eyselia, <i>Rehb.</i>	Phallacrocarpum	Centrachena,	Chlamysperma <i>Less</i>
Venegasia, <i>DC.</i>	[<i>DC.</i>	[<i>Schott.</i>	Villanova, <i>Lag.</i>
Leucopsidium, <i>DC.</i>	Prolongoa, <i>Bois.</i>	Preauxia, <i>C. H. S.</i>	Brachymeris, <i>DC.</i>
Xanthocephalum <i>W</i>	Adenachena, <i>DC.</i>	Monoptera, <i>C. H. S.</i>	Brachystylis, <i>E. M</i>
Phymaspermum,	Matricaria, <i>L.</i>	Stigmatotheca, <i>C.</i>	Jacosta, <i>E. M.</i>
[<i>Less.</i>	Pyrethrum, <i>Gärt.</i>	[<i>H. S.</i>	

Div. 3. *Cotulineæ*.—Heads discoid, sometimes homogamous, sometimes heterogamous; florets of the disk occasionally hermaphrodite. Semi-florets pistillate, in one or many series. Receptacle naked.

GENERA AND SYNONYMES.

Lapeyrousia, <i>Th.</i>	Baldingeria, <i>Nek.</i>	Strongylosperma,	Homalotes, <i>DC.</i>
Peyrousia, <i>DC.</i>	Ananthoeyclus,	[<i>Less.</i>	Aromia, <i>Nutt.</i>
Otochlamys, <i>DC.</i>	[<i>Vaill.</i>	Cenia, <i>Comm.</i>	Amblyopappus,
Colula, <i>Gärt.</i>	Cenocline, <i>Koch.</i>	Lancisia, <i>Gärt.</i>	[<i>H. & Arn.</i>
Lancisia, <i>Ad.</i>		Cotula, <i>Vaill.</i>	Infantea, <i>Rémy.</i>

Div. 4. *Athanasineæ*.—Heads homogamous, with all the corollas tubular. Receptacle chaffy. Seed-nuts angular or cylindrical, never obcompressed. Pappus wanting, minutely scaly.

GENERA AND SYNONYMES.

Lonas, <i>Ad.</i>	Hymenolepis <i>Cass</i>	Bembecodium, <i>Knz.</i>	Saintmorysia, <i>Endl.</i>
Gonospermum, <i>Less</i>	Holophyllum, <i>Less.</i>	Athanasia, <i>Cass.</i>	Morysia, <i>Cass.</i>
Metagnanthus <i>Endl</i>	Pristocarpa <i>E. M</i>		

Div. 5. *Artemisineæ*.—Heads discoid, homogamous or heterogamous. Florets of the disk always hermaphrodite, those of the ray pistillate, in one or several series. Corollas of the disk cylindrical with two-cleft styles. Seed-nuts not winged, rarely if ever plano-obcompressed. Receptacle naked.

GENERA AND SYNONYMES.

Stilpnophytum <i>Less</i>	Artemisia, <i>L.</i>	„ Abrotanum, <i>T.</i>	Crossostephium,
Mesotetrus, <i>DC.</i>	Oligosporus, <i>Cass</i>	Absinthium, <i>T.</i>	[<i>Cass.</i>
Lepidotheca, <i>Nutt.</i>	Seriphida, <i>Less.</i>		Decaneurum, <i>C. H. S</i>

Xantho, Rémy.	Plagiüs, Herit.	Pentzia, Th.	Sphæromorphæa, [DC.
Tanacetum, L.	Balsamita, Less.	Chlamydomphora, [Ehrenb.	Machlis, DC.
Psanacetum, Nèk.	Adenosolen, DC.	Myriogyne, Less.	
Sphæromeria, Nutt.	Marasinodes, DC.		

DIV. 6. *Hippineæ*.—Heads monœcious—that is, with the florets of the ray pistillate, and those of the disk staminate. The corollas all tubular, cylindrical. Styles of the disk simple, truncate at the apex. Seed-nuts bald, obcompressed or angular. Receptacle naked.

GENERA AND SYNONYMES.

Abrotanella, Cass.	Leptinella, Cass.	„ Gymnostyles Juss	Hippia, L.
Trineuron, Hook. f.	Plagiophilus, Arn.	Solivæa, Cass.	Scleroleima, Hook. f.
Ceratella, Hook. f.	Soliva, R. & P.	Gymnostyles Pers	

DIV. 7. *Eriocephalineæ*.—Heads many-flowered, monœcious—that is, with the florets of the ray pistillate, a few strap-shaped or tubular; those of the disk staminate, tubular, cylindrical, the style clavato-truncate. Seed-nuts obcompressed, wingless, naked. Receptacle chaffy.

GENUS AND SYNONYMES.

Eriocephalus, L.	„ Cryptogyne, Cass.	„ Brachygyne, Cass.	„ Siphogyne, Cass.
Monochlæna Cass	Microgyne, Cass.	Sclenogyne, Cass.	Stenogyne, Cass.

SUB-TRIBE 7. GNAPHALIDÆ.—Heads homogamous or heterogamous, many, few, or rarely one-flowered. Corollas tubular, five-toothed. Florets of the females thread-like, rarely strap-shaped. Anthers tailed at the base. Arms of the styles of the hermaphrodite florets without appendages, those of the males generally undivided. Pappus generally hairy or bristly, rarely wanting. Leaves alternate, with a few exceptions.

DIV. 1. *Agianthineæ*.—Heads one or many-flowered, collected into a glomerulum, girded with a general involucre.

GENERA AND SYNONYMES.

Stylancerus, Lab.	Cassinia, R. Br.	Myriocephalus,	Craspedia, Forst.
Ogcrostylus Cass	Hirnelia, Cass.	[Benth.	Richia, Lab.
Actinobole, Endl.	Skirrhoporus, DC.	Gnephosis, Cass.	Pycnosorus, Benth.
Hyalolepis, DC.	Eriocladium,	Pachysurus, Steetz.	Chrysocoryne, Endl.
Phyllocalymma Bth	[Lindl.	Calocephalus, R. Br.	Crossolepis, Benth.
Agianthus, Wendl.	Pogonolepis, Steetz	Leucophyta, R. Br.	

DIV. 2. *Cassinieæ*.—Heads not collected into a glomerule. Receptacle entirely chaffy or only so at the margin.

GENERA AND SYNONYMES.

Ammobium, R. Br.	Cassinia, R. Br.	Achromolæna,	Chthonocephalus,
Ixodia, R. Br.	Chromochiton,	[Cass.	[Steetz.
Rhynea, DC.	[Cass.	Apalochlamys, Cass	

DIV. 3. *Helichrysineæ*.—Heads many or few-flowered, not collected into a glomerule, and not girded by a common involucre. Receptacle

naked. Florets either all hermaphrodite and tubular, or, in the laterals, pistillate or neuter, tubular or rarely strap-shaped.

GENERA AND SYNONYMES.

Humea, <i>Sm.</i>	Sealiopsis, <i>Walp.</i>	Argyrocome,	Xerotium, <i>B. & F.</i>
Calomeria, <i>Vent.</i>	Podolepis, <i>Lab.</i>	[<i>Schrank</i>	Metalasia, <i>R. Br.</i>
Agathomeris,	Sealia, <i>Sinis.</i>	Damironea, <i>Cass.</i>	Endoleuca, <i>Cass.</i>
[<i>Delavne.</i>	Stylolepis, <i>Lehm.</i>	Edmondia, <i>Cass.</i>	Erythropogon, <i>DC.</i>
Oxypheria, <i>Hort.</i>	Doratolepis, <i>Benth</i>	Aphelixis, <i>Don.</i>	Lachnospermum, <i>W</i>
Razumovia, <i>Sp.</i>	Siemssenia, <i>Steetz.</i>	Xeranthemum,	Carpholoma, <i>Don</i>
Crossolepis, <i>Less.</i>	Swammerdamia <i>DC</i>	[<i>Neck.</i>	Pachyrhynchus <i>DC</i>
Pithoearpa, <i>Lindl.</i>	Ozothamnus, <i>R. Br</i>	Aphelixis, <i>Boj.</i>	Elytropappus, <i>Cass.</i>
Quinetia, <i>Cass.</i>	Faustula, <i>DC.</i>	Freemanina, <i>Boj.</i>	Disparago, <i>Gärt.</i>
Rutidosia, <i>DC.</i>	Petalolepis, <i>DC.</i>	Ilyalosperma, <i>Steetz</i>	Wigandia, <i>Less.</i>
Anisolepis, <i>Steetz.</i>	Chrysocephalum,	Stenocline, <i>DC.</i>	Amphiglossa, <i>DC.</i>
Rhodanthe, <i>Lindl.</i>	[<i>Wlp.</i>	Achyrocline, <i>DC.</i>	Dimorpholepis <i>AGr</i>
Lawrencella, <i>Lindl.</i>	Eriosphæra, <i>Less.</i>	Gnaphalium, <i>Don.</i>	Pteropogon, <i>DC.</i>
Xyridanthe, <i>Lindl.</i>	Leontonyx, <i>Cass.</i>	Omalotheca, <i>DC.</i>	Acroclinium, <i>A. Gr.</i>
Podotheca, <i>Cass.</i>	Spiralepis, <i>Don.</i>	Cladochaeta, <i>DC.</i>	Belloa, <i>Rémy.</i>
Podosperma, <i>Lab.</i>	Helichrysum, <i>DC.</i>	Pteropogon, <i>DC.</i>	Cephalipterum <i>AGr</i>
Phænopodæ, <i>Cass</i>	Anaxeton, <i>Gärt.</i>	Schœnia, <i>Steetz.</i>	Conanthodium <i>AGr</i>
Leptorhynchus <i>Less</i>	Argyrocome <i>Gr</i>	Lasiopogon, <i>Cass.</i>	Asteridea, <i>Lindl.</i>
Rhytidanthe <i>Benth</i>	Lepieline, <i>Cass.</i>	Amphidoxa, <i>DC.</i>	Roulia, <i>Lindl.</i>
Waitzia, <i>Wendl.</i>	Ercephyllum,	Demidium, <i>DC.</i>	Pterygopappus,
Viraya, <i>Gaud.</i>	[<i>Less.</i>	Filago, <i>T.</i>	[<i>Hook. f.</i>
Morna, <i>Lindl.</i>	Leucostemma,	Gifola, <i>Cass.</i>	Actinopappus,
Millotia, <i>Cass.</i>	[<i>Don.</i>	Impia, <i>Dod.</i>	[<i>Hook. f.</i>
Pterochaeta, <i>Steetz.</i>	Pentataxis, <i>Don.</i>	Oglifa, <i>Less.</i>	Moneneyanthes, <i>A.</i>
Ixiolena, <i>Benth.</i>	Enchloris, <i>Don.</i>	Logfia, <i>Cass.</i>	[<i>Gr.</i>
Chrysodisens, <i>Steetz</i>	Helipterum, <i>DC.</i>	Achariterium, <i>B</i>	Achrysum, <i>A. Gr.</i>
Panetia, <i>Cass.</i>	Astelma, <i>Less.</i>	[<i>& F.</i>	

Div. 4. Seriphineæ.—Heads one-flowered, sometimes free, sometimes collected into a dense glomerule; not girded by a general involucre.

GENERA AND SYNONYMES.

Stœbe, <i>Less</i>	„ Pleurocephalum, <i>Cass.</i>	Petrotriche, <i>Cass.</i>
Seriphium, <i>Less.</i>	Aerocephalum, <i>Cass.</i>	Gymnachæna, <i>Rehb.</i>
Erernanthis, <i>Cass.</i>		

Div. 5. Antennarineæ.—Heads many-flowered, not collected into a glomerule, diœcious or monœcious; the staminate flowers bearing the simplest style, with a clavo-truncate apex. Receptacle naked, or only chaffy at the margin.

GENERA AND SYNONYMES.

Trichogyne, <i>Less.</i>	Petalolepis, <i>Less.</i>	Disynanthus, <i>Raf.</i>
Ihoga, <i>Cass.</i>	Anaxeton, <i>Cass.</i>	Anaphalis, <i>DC.</i>
Phænocoma, <i>Don.</i>	Argyranthus, <i>Neck.</i>	Leontopodium, <i>R. Br.</i>
Petalactæ, <i>Don.</i>	Antennaria, <i>R. Br.</i>	

Div. 6. Leysserineæ.—Heads many-flowered, radiate; semi-florets pistillate. Pappus scaly, in some chaff-like, in others bristly, never coronate. Receptacle naked. Leaves almost always alternate. Cape-shrubs.

GENERA AND SYNONYMES.

Athrixia, <i>Ker.</i>	Leyssera, <i>L.</i>	„ Callicornia, <i>Burm</i>	Pterothrix, <i>DC.</i>
Asteropsis, <i>Less.</i>	Asteropterus,	Leptophytus, <i>Css.</i>	Relhania, <i>Th.</i>
Antithrixia, <i>DC.</i>	[<i>Vaill.</i>	Longchampia, <i>W.</i>	Rosenia, <i>Th.</i>

DIV. 7. *Relhanineæ*.—Heads many-flowered, homogamous or radiate; semi-florets pistillate or neuter. Pappus sometimes wanting, sometimes with scales, which are more or less conerete at the base, or crown-shaped. Receptacle naked, free.

GENERA AND SYNONYMES.

Carpesium, <i>L.</i>	Nestlera, <i>Sp.</i>	Eclopes, <i>Gärt.</i>	Bellidiastrum,
Conyzoides, <i>T.</i>	Stephanopappus,	Rhyncepsidium,	[<i>Vaill.</i>
Amblyocarpum,	[<i>Less.</i>	[<i>DC.</i>	Spanotrichum,
[<i>F. & M.</i>	Columellea, <i>Jacq.</i>	Rhynceocarpus,	[<i>E. M.</i>
Syncephalum, <i>DC.</i>	Polychætia, <i>Less.</i>	[<i>Less.</i>	Osmitopsis, <i>Cass.</i>
Oligodora, <i>DC.</i>	Relhania, <i>Herit.</i>	Osmites, <i>Cass.</i>	Osmites, <i>L.</i>

SUB-TRIBE 8. *SENECIONIDÆ*.—Heads *homogamous, or generally heterogamous, never truly diœcious, discoid or radiate, with the semiflorets generally in one series. Receptacle almost always naked. Anthers without tails at the base. Seed-nuts crowned with a hairy or bristly pappus; the exterior ones here and there naked.*

DIV. 1. *Neurolineæ*.—Receptacle chaffy.

GENUS AND SYNONYMES.

Neurolana, *R. Br.*
Calca, *Gärt.*
Neurochlœna, *Less.*

DIV. 2. *Erechtitineæ*.—Receptacle naked, or honeycombed and bristled. Heads discoid, heterogamous, with the flowers of the ray tubular, pistillate, or somewhat diœcious, with the pistillate flowers tubular.

GENERA AND SYNONYMES.

Faujasia, <i>Cass.</i>	Stilpogync, <i>DC.</i>	Crassocephalus, <i>Less.</i>
Eriothrix, <i>Less.</i>	Erechtites, <i>Raf.</i>	Cremoecephalum, <i>Cass.</i>
Eriotrix, <i>Cass.</i>	Neoccis, <i>Cass.</i>	Crassocephalum, <i>Mön.</i>

DIV. 3. *Senecioneæ*.—Receptacle naked, or honeycombed and bristled. Heads homogamous, discoid, or radiate. Semi-florets pistillate, or rarely sterile. Seed-lobes flat.

GENERA AND SYNONYMES.

Gynura, <i>Cass.</i>	Senecillis, <i>Gärt.</i>	Doronicum, <i>L.</i>	Cacalia, <i>DC.</i>
Emilia, <i>Cass.</i>	Ligularia, <i>Cass.</i>	Werneria, <i>H. B. K.</i>	Psacalium, <i>DC.</i>
Asterosperma, <i>Less.</i>	Hoppea, <i>Rehb.</i>	Oresigonia, <i>W.</i>	Pentacalia, <i>Cass.</i>
Oligothrix, <i>Cass.</i>	Arnica, <i>L.</i>	Oribasia, <i>Fl. Mez.</i>	Lopholœna, <i>DC.</i>
Mesogramma, <i>DC.</i>	Aronicum, <i>Neck.</i>	Culcitium, <i>H. & B.</i>	Kleinia, <i>L.</i>
Cineraria, <i>Less.</i>	Grammarthron,	Oresigonia, <i>Schl.</i>	Cacalia, <i>DC.</i>
Xenocarpus, <i>Cass.</i>	[<i>Cass.</i>	Gynoxis, <i>Cass.</i>	Delairea, <i>Lemaire.</i>

Cacalanthemum, [Dill.]	„ Eudorus, <i>Cass.</i>	Ætheolaena, <i>Cass.</i>	Notonia, <i>DC.</i>
Alecia, <i>DC.</i>	Hubertia, <i>Bory.</i>	Dorobaea, <i>Cass.</i>	Nothonia, <i>Endl.</i>
Senecio, <i>Less.</i>	Pithosillum, <i>Cass.</i>	Roldana, <i>Ll. & L.</i>	Lachanodes, <i>DC.</i>
Anieio, <i>Neck.</i>	Synarthrum, <i>Cass.</i>	Brachyrhynchus, [<i>Less.</i>]	Euryops, <i>Cass.</i>
Aspelina, <i>Neck.</i>	Sclerobasis, <i>Cass.</i>	Crocidium, <i>Hook.</i>	? Hertia, <i>Neck.</i>
Seneciotypus, [<i>Dum.</i>]	Carderina, <i>Cass.</i>	Madaraetis, <i>DC.</i>	Enantiotrychum, [<i>E. Mey.</i>]
Obejaea, <i>Cass.</i>	Danaa, <i>Colla.</i>	Tetradymia, <i>DC.</i>	Psathyrotes, <i>A. Gr.</i>
Herbiehia, <i>Zaw.</i>	Heterolepis, <i>Bert.</i>	Lagothamnus, [<i>Ldl.</i>]	Centropappus, [<i>Hook, f.</i>]
Farobaea, <i>Schrnk.</i>	Adenotrichia, [<i>Ldl.</i>]	Raillardia, <i>Gaud.</i>	Melalema, <i>Hook, f.</i>
	Scrobicaria, <i>Cass.</i>	Bedfordia, <i>DC.</i>	

DIV. 4. *Balbisineæ*.—Receptacle naked. Head homogamous, discoid or radiate, somewhat diœcious. Seed-lobes involute.

GENERA AND SYNONYME.

Balbisia, *DC.*
Ingenhouzia, *Berter.*
Robinsonia, *DC.*

TRIBE 5. *Cynarææ*.—Style in the perfect flowers often thickened near the summit, and fringed at the swelling; arms sometimes concrete, sometimes free, minutely pubescent externally; stigmatic series reaching the apex of the arms, and there becoming confluent, Fig. 134, B.

SUB-TRIBE 1. *CALENDULIDÆ*.—Heads many-flowered, heterogamomœcious. Florets of the ray strap-shaped, pistillate, and fertile; those of the disk tubular, five-toothed, hermaphrodite, sterile or staminate by abortion. Involucre in one or a few series. Receptacle naked, honey-combed, or rarely bristled. Anthers of the disk with a very short tail at the base. Corolla almost always bearded at the base. Style of the ray with two arms, elongated, those of the disk almost undivided, swollen, bearded with a belt of hairs; superiorly in the form of a two-cleft cone, with the arms very approximate or somewhat concrete. Seed-nuts of the ray frequently deformed, those of the disk abortive. Herbs or shrubs more or less glandular, yielding from almost all their parts a grateful odour.

DIV. 1. *Calendulineæ*.—Heads many-flowered, radiate. Florets of the ray in one or three series, strap-shaped, pistillate; those of the disk tubular, hermaphrodite, or sterile by the abortion of the pistil. Involucre in one or two series, with free scales. Anthers with short tails at the base. Seed-nuts of the ray fertile, beaked, without pappus, generally curved, and various in form. Herbs or under-shrubs of the Old World.

GENERA.

Calendula, *Neck.*
Oligocarpus, *Less.*
Tripteris, *Less.*

DIV. 2. *Osteospermineæ*.—Heads many-flowered, radiate. Florets of the ray strap-shaped, pistillate; those of the disk tubular, hermaphrodite, or sterile by the abortion of the pistil. Involucre in few series, with free

scales. Seed-nuts of the ray fertile, not beaked, various in form; those of the disk abortive, generally cylindrical. Shrubs, or rarely herbaceous perennials. Almost all natives of Southern Africa. Flowers yellow.

GENUS AND SYNONYMES.

Osteospermum, L.
Chrysanthemoides, T.
Ericolinc, Cass.

DIV. 3. *Othoninæ*.—Heads many-flowered, radiate, with the marginal florets strap-shaped or tubular, pistillate; those of the disk tubular, five-toothed, staminate, with a simple, abortive style. Pappus bristly, that of the ray frequently in many series; that of the disk in one series or wanting. Scales of the involucre in one or few series, free, or more or less concrete with each other. Almost all natives of the Cape, and with yellow flowers.

GENERA AND SYNONYMES.

<i>Heteractis</i> , DC.	<i>Aristotela</i> , Ad.	<i>Hertia</i> , Less.
<i>Gymnodiscus</i> , Less.	<i>Calthoides</i> , B. Juss.	<i>Ruckeria</i> , DC.
<i>Othonna</i> , L.	<i>Doria</i> , Less.	

SUB-TRIBE 2. ARCTOTIDÆ.—Head many-flowered, sometimes homogamous, discoid, or very frequently radiate, with semi-florets in one series, pistillate or neuter; florets of the disk hermaphrodite, but their central ones sometimes sterile by compression. Anthers with short tails at the base. Style of the hermaphrodite flowers swollen above, furnished with a whorl of hairs; the lobes concrete, minutely hispid externally, obtuse and free at the apex. Seed-nuts not beaked, top-shaped, furnished with terminal areola, generally covered with long soft hairs, naked, or pappose. Pappus in no way girded by a somewhat prominent margin, with broad, chaffy, or rarely somewhat bristly scales. Herbs or under-shrubs, all natives of southern Africa beyond the tropics. Leaves almost always alternate.

DIV. 1. *Arctotineæ*.—Scales of the involucre unarmed and distinct. Heads always radiate. Semi-florets pistillate or rarely neuter. Seed-nuts always winged.

GENERA AND SYNONYMES.

<i>Arctotis</i> , Gärt.	<i>Cymbonotus</i> , Cass	<i>Landtia</i> , Less.	<i>Heterolepis</i> , Cass.
<i>Arctotheca</i> , Vaill.	<i>Venidium</i> , Less.	<i>Arctotheca</i> , Wendl.	<i>Heteromorpha</i> ,
<i>Arctotis</i> , Cass.	<i>Cleithria</i> , Schrd.	<i>Cryptostemma</i> , R.Br.	[Cass.
<i>Odontoptera</i> Cass	<i>Haplocarpha</i> , Less.	<i>Cynotis</i> , Hoffmg.	<i>Ubiæa</i> , J. Gay.
<i>Steganotus</i> , Cass.	<i>Aloiozonium</i> , Knze.	<i>Microstephium</i> Less	

DIV. 2. *Gorterineæ*.—Scales of the involucre, at least the external and middle ones, prolonged into a spine, often broadly dentato-spinose, and more or less concrete at their base. Semi-florets always neuter, sometimes absent.

GENERA AND SYNONYMES.

Stephanocoma, Less.	Bretheillea, Buch.	Rohria, Vall.	Mœhnia, Neck.
Cullumia, R. Br.	Cuspidia, Gärt.	Gorteria, Lam.	Melanchrysum,
Gorteria, Gärt.	Aspidalis, Gärt.	Zarabellia, Neck.	[Cass.]
Personaria, Lam.	Berkheya, Ehrh.	Evopis, Cass.	Stobæa, Th.
Hirpicium, Cass.	Crocodylodes, Ad.	Gazania, Gärt.	Apuleia, Gärt.
Didelta, Less.	Basteria, Houtt.	Mussinia, W.	? Arelinia, Neck.
Favonium, Gärt.	Agriphyllum Juss.		

SUB-TRIBE 3. ECHINOPSIDÆ.—Heads one-flowered, collected into a globose glomerule, which is involucred with numerous leaflets, and has the appearance of a single head; sessile articulated above the common globose receptacle. Involucre with scales in many series, the external of which are hairy or woolly at the base, fringed or ciliated on the margin as far as the middle, and often concrete together or with the ovary. Florets all hermaphrodite, fertile. Corolla with the tube cylindrical, abruptly inflated at the orifice, and with five unequal lobes. Stigma smooth, naked. Fruit silky, villous. Pappus with short bristles, sometimes distinct, sometimes more or less united into a crown, either of a short crown-shape, or with the bristles somewhat united in two series.

GENERA AND SYNONYME.

Echinops, L.	Acantholepis, Less.
Echinanthus, Neck.	

SUB-TRIBE 4. CARDOPATIDÆ.—Heads few-flowered, homogamous. Involucre cylindrical, with the exterior scales or bracts pinnatifidly spinous, the interior entire, mucronate. Anthers with tails at the base; tails hairy backwards. Seed-nuts beaked, villous, terminated by an areola. Pappus in one series long and chaffy, without any prominent margin girding the base; chaff entire.

GENERA AND SYNONYMES.

Cardopatum, Juss.	„ Brotera, W.
Cardopatum, Pers.	Chamæleon, C. Bauh.

SUB-TRIBE 5. XERANTHEMIDÆ.—Heads many-flowered, heterogamous, discoid. Florets at the circumference in one series, pistillate, the rest hermaphrodite. Involucre dry and membranous, forming a ray, in many series, with distinct chaffy scales. Receptacle chaffy. Hermaphrodite corollas five-toothed, the pistillate three-toothed or two-lipped. Seed-nuts top-shaped, those of the hermaphrodite flowers villous, the pistillate smooth, with a great epigynous disk terminated by an areola. Pappus not girded by a prominent margin; with a few long semi-lanceolate entire chaffs.

GENERA AND SYNONYMES.

Xeranthemum, T.	Chardinia, Desf.
Xeroloma, Cass.	Siebera, Gay.
Harrisonia, Neck.	

SUB-TRIBE 6. CARLINIDÆ.—Heads many-flowered, never dioecious. Involucre in many series, with distinct often spiny scales. Corolla of the herma-

phrodite florets five-cleft, of the pistillate or sterile variously deformed. Stamens with the filaments free, naked, smooth. Anthers with tails at the base, which are generally long, bearded, and somewhat connected. Seed-nuts generally villous. Pappus in one or two series, feathery or hairy, not chaffy; the hairs sometimes variously concrete.

GENERA AND SYNONYMES.

Saussurea, DC.	Theodoria, Cass.	Aretion, Cass.	Carlowizia, Mön.
Heterotrichum,	Aueklandia, Falc.	Villarsia, Guet.	Athamus, Neck.
[Bieb.	Apilotaxis, DC.	Bernardia, Vill.	Atraetylis, L.
Bennetia, Gray.	Haplotaxis, Endl.	Steehmannia, DC.	Thevenotia, DC.
Cyathidium, Cass.	Frolovia, Ledeb.	Stæhelina, DC.	Cousinia, Cass.
Lagurostemon,	Eriocoryne, Watt.	Kœchlia, Endl.	Aneathia, DC.
[Cass.	Dolomieu, DC.	Carlina, T.	Auchera, DC.
Eucassurca, C.A.M.	Aretium, Lam.	Mitina, Ad.	Polytaxis, Bunge.
Eriostemon, Less.	Aretio, Lam.		

SUB-TRIBE 7. CENTAURIDÆ.—Heads many-flowered. Scales imbricate, furnished with appendages, rarely without them. Florets of the ray most frequently neuter, with a large corolla irregularly five-cleft, generally surmounting the disk. Filaments distinct, generally papillose. Seed-nuts compressed, rarely cylindrical, almost always marked with a lateral areola. Pappus rarely wanting, hairy or chaffy, generally in many series, never feathery.

GENERA AND SYNONYMES.

Amberboa, Pers.	Crupina, Cass.	„ Pterolophus, Cass.	Acrolophus, Cass.
Chryseis, Less.	Centaurea, Less.	Leptanthus DC	Acrocentron Cass
Goniocaulon Cass	Crocodilium, DC.	Stenolophus, Cass	Hymenocentron,
Cyanopsis, Cass.	Caleitrapa, DC.	Ætheopappus,	[Cass.
Lacellia, Viv.	Cyanus, DC	[Cass.	Verutina, Cass.
Volutarella, Cass.	Centaurium, DC.	Stizolophus, Cass.	Mesocentron Cass
Voluntaria, Cass.	Microlophus, Cass	Plectocephalus,	Triplocentron,
Chryseis, Cass.	Piptoceras, Cass.	[Don.	[Cass.
Psephellus, F & M	Phrygia, Gray.	Psephellus, Cass.	Seridia, Juss.
Amblyopogon, F.	Hypochaeris, Gr.	Heterolophus,	Podia, Neck.
[& M.	Polyacantha, Gr.	[Cass.	Philostizus, Cass.
Zoegea, L.	Leucantha, Gr.	Cheirolophus,	Pectinastrium,
Microlophus, DC.	Phalolepis, Cass.	[Cass.	[Cass.
Mantisalea, Cass.	Callicephalus C. A	Melanoloma, Cass	Alophium, Cass.
Tricholepis, DC.	[M.	Odontolopus Cass	Cnicus, Vaill.
Archyropappus,	Chartolepis, Cass.	Lopholoma, Cass.	Carbeni, Ad.
[Bieb.	Jaeca, Cass.	Spilacron, Cass.	Tetramorphaea, DC.
Tomanthea, DC.	Platylophus, Cass		

SUB-TRIBE 8. CARTHAMIDÆ.—Heads many-flowered. Scales of the involucre in many series, generally spiny, the external ones in the form of bracts, leafy. Florets all hermaphrodite, or very rarely a few of the external sterile. Corollas five-cleft. Filaments generally ornamented with a bundle of hairs, or strewed with them. Seed-nuts very smooth, four-sided, with a lateral areola. Pappus wanting or chaffy, in many series, rarely rough, hairy.

GENERA AND SYNONYMES.

Kentrophyllum,	„ Hohenwartha,	Carthamus, Schk.	Onobroma, DC.
[Neck.	[West.	Atractylis, Vaill.	Carduncellus, Ad.
	Heracantha, Link	Carthamus, T.	

SUB-TRIBE 9. SILYBIDÆ.—*Heads many-flowered. Scales of the involucre in many series, with a spiny point. Florets all hermaphrodite and equal, or the marginal ones larger and neuter. Filaments in one bundle. Anthers without tails at the base. Seed-nuts smooth, compressed. Pappus in many series, hairy or feathery. Leaves blotched with white.*

GENERA.

Silybum, Vaill.
Galactites, Mœneh.
Tyrimnus, Cass.

SUB-TRIBE 10. CARDUIDÆ.—*Heads many and equal-flowered, homogamous, with all the florets hermaphrodite or diœcious. Involucre in many series, with the scales free and often spiny at the point. Corollas five-cleft, with the external lobes rather deeply cut. Filaments distinct, hairy, pappillose, rarely smooth. Anthers short-tailed or tailless. Seed-nuts very smooth, not beaked, with a terminal areola. Pappus hairy or feathery, the bristles often concrete into a ring at the base, which is never girded with a prominent margin.*

GENERA AND SYNONYMES.

Onopordon, Vaill.	Pienocomon,	Cephalonoplos,	Lamyra, Cass.
Acanos, Ad.	[Dalech.	[Neek.	Platyrhaphium,
Cynara, Vaill.	Cirsium, T.	Breca, Less.	[Cass.
Spanioptilon, Less.	Cnicus, Schreb.	Onotrophe, Cass.	Notobasis, Cass.
Carduus, Gärt.	Lophiolepis, Cass.	Erythrolœna, Sweet	Echenais, Cass.
Clavena, DC.	Eriolepis, Cass.	Chamœpence, Alp.	Lappa, T.
Pienomon, Lob.	Epitrachys, DC.	Cirsium, Less.	Arctium, Vill.
Acarna, Vaill.	Orthocentrum,	Ptilostemon, Less	Myopordon, Boiss.
	[Cass.		

SUB-TRIBE 11. SERRATULIDÆ.—*Heads many-flowered. Scales of the involucre in many series, distinct, scarcely spiny. Florets all hermaphrodite or diœcious, rarely a few pistillate in the circumference. Corollas five-cleft, curved outwards. Filaments pappillose or hairy. Anthers without tails. Seed-nuts smooth. Pappus in one or generally in many series, hairy or feathery, girded with a prominent circular margin.*

GENERA AND SYNONYMES.

Acroptilon, Cass.	Hookia, Neek.	Malacoccephalus,	Pereuphora,
Rhaponticum, DC.	Centaurium, Hall	[Tau.	[Hoffms.
Stemmacantha,	Leuzea, DC	Alfredia, Cass.	Klasea, Cass.
[Cass.	Fornicium C.A.M	Serratula, DC.	Jurinea, Cass.
Cestrinus, Cass.	Halocharis, Bieb.	Mastrutium, Cass	Stictophyllum Edgwo

SUB-ORDER II.—LABIATIFLORA, Fig. 133, b.

Corollas mostly two-lipped; the exterior lip three, or rarely four-cleft, the interior two-cleft or divided. rarely entire.

TRIBE 6. Mutisiæ.—Style two-cleft, swollen above; arms convex and hairy, sometimes very short, sometimes elongated, truncated, scarcely diver-

gent or erect, Fig. 134, c. Pappus perfect, in many rays. Heads heterogamous, rarely diœcious; florets pistillate, hermaphrodite, or neuter, in one or in many series in the circumference. Involucre imbricate. Receptacle naked. Staminate corollas, two-lipped or irregular, rarely regular; the pistillate almost never filiform. Anthers rigid, with broad wings, rarely without tails.

SUB-TRIBE 1. MUTISIDÆ.—*Heads very rarely one-flowered. Pistillate florets generally in one series in the circumference, the others hermaphrodite. Style thick, with the arms very convex externally in the hermaphrodite florets, the external as well as the superior part is either downy or smooth. Pollen often smooth, elliptical. Shrubs or herbs with large showy heads.*

DIV. 1. *Barnadesineæ*.—Anthers without tails.

GENERA AND SYNONYMES.

Schlechtendalia, [Less.	Moquinia, DC.	Bichenia, Don.	Gerbera, Gronov.
Diacantha, Less.	Spadonia, Less.	Cherina, Cass.	Aphyllocaulon, [Lag.
Barnadesia, L. f.	Gochnatia, H. B. K.	Euthrixia, Don.	Oreoseris, DC.
Bacazia, R. & P.	Cyclolepis, Don.	Proselia, Don.	Berniera, DC.
Diacantha, Lag.	Cyclopis, Guill.	Prionotophyllum, [Less.	Dicoma, Cass.
Penthea, Don.	Anastraphia, Don	Tylloma, Don.	Leucophyton Less
Dasyphyllum, HBK	Pentaphorus, Don	Pachylæna, Don.	Xeropappus Wall
Fulcaldea, Poir.	Hedraiophyllum, [Less.	Trichocline, Cass.	Microcoma, DC.
Turpinia, H. & B	Augusta, Leandr.	Amblysperma, Benth	Rhigiothamnus, [Less.
Voigtia, Sp.	Stiffia, Mik.	Onoseris, DC.	Macleodium, Cass.
Dolichostylis Cass	Sanhillaria, Lean.	Cladoseris, Less.	Nitelum, Cass.
Flotovia, Sp.	Mocina, DC.	Chaetactæna, Don.	Printzia, Cass.
Chuquiraga, Don.	Mutisia, L. f.	Isotypus, H. B. K.	? Lloydia, Neek.
Piptocarpha, Hk.	Guariruma, Cass.	Seris, W.	Perdicium, Lag.
Nardophyllum.	Holophyllum, Les	Hilaria, DC.	Pardisium, Burm
[Hook.	Haplophyllum, [Les.	Oldenburgia, Less.	Leiocarpum, DC.
Seris, Less	Proustia, Lag.	Seytala, E. Mey.	Anandria, Sieg.
Lycoseris, Cass.	Leucocryphe, Endl	Leucomeris, Don.	Leibnitzia, Cass.
Diazeuxis, Don.	Thelecarpea, DC.	Myriopsis, Bunge.	Oriastrum, Pöpp
Langsdorfia, W.	Harmodia, Don.	Ainsliæa, DC.	Linochilus, Benth.
Chaetactæna, Don.	Calopappus, Meyen.	Liatris, Don.	Rhodaetinia, Gardn
Chuquiragua, Juss.	Hyalis, Don.	Piloselloides, Less	Aglaodendron, [Rémy.
Johannia, W.	Brachyclados, Don.	Leptica, E. Mey.	Aldunatea, Rémy.
Joannesia, Pers.	Chætanthera, R. & P	Chionopectera, DC.	
Joannca, Sp.		Carmelita, C. Gay.	

SUB-TRIBE 2. LERIDÆ.—*Heads heterogamous, homocarpous. Pistillate florets in several series at the circumference, the rest staminate; sterile, from the ovary being abortive. Scales of the involucre membranous, erect. Corolla slender, smooth, with the limb not at all inflated; the staminate five-nerved, the hermaphrodite now and then filiform. Anthers with tails. Filaments distinct. Pollen globose, smooth. Style swollen at the base, the arms externally downy above. Pappus hairy.*

GENERA AND SYNONYMES.

Farfugium, Lindl.	Cursonia, Nutt.	Oxydon, Less.	Loxodon, Cass.
Chaptalia, Vent.	Lieberkuhna, Cass.	Oxydon, DC.	Chevreulia, Cass.
Leria, DC.			

SUB-TRIBE 3. FACELIDÆ.—*Heads many-flowered, heterogamous. Pistillate florets in one or several series at the circumference, a few hermaphrodite or staminate at the centre. Staminate corollas regularly five-toothed; the pistillate, if in one series, strap-shaped. Style slender, with the arms of the hermaphrodite flowers truncate, closed, downy above, externally. Seed-nuts not beaked, densely villous.*

GENERA.

Lucilia, *Cass.*
Oligandra, *Less.*
Facelis, *Cass.*

TRIBE 7. Nassaviæ.—*Heads ray-like, with equal florets, homogamous, few or many-flowered. Florets hermaphrodite; involucre in one or a few series, with free scales. Corollas five-nerved, two-lipped, slender, with the tube not, or scarcely distinct from the limb; the lips shorter than the entire part, the exterior one embracing three-fifths of the whole corolla, and, in the exterior florets, gradually passing into strap-shape; the interior smaller, not embracing more than two parts of the corolla. Anthers not surmounted with an appendage at the apex; some long, broad, and of a firmer substance. Filaments free, flat, smooth. Pollen smooth, globose. Style swollen at the base, with free arms, not joined together in one, equal, semi-cylindrical, with the apex more or less divergent or revolute, truncate; somewhat fringed; on the inside, the stigmatic series not confluent at the apex.*

SUB-TRIBE 1. NASSAVIDÆ.—*Heads, at the most, five-flowered. Scales of the oblong involucre keel-shaped; the interior series three to five, with the margins touching each other, and embracing the flower, the two opposite ones keeping the head compressed or ob-compressed.*

GENERA AND SYNONYMES.

Nassavia, <i>Comm.</i>	Triptilium, <i>DC.</i>	Sphærocephalus,	Cephaloseris,
Nassovia, <i>Pers.</i>	Acanthophyllum,	[<i>Lag.</i>	[<i>Pöpp.</i>
Mastigophorus,	[<i>H. & Arn.</i>	Portalesia, <i>Meyen</i>	Panagyryum, <i>Lag.</i>
[<i>Cass.</i>	Strongyloma,	Polyachyrus, <i>Lag.</i>	Pentanthus, <i>Less.</i>
Triachne, <i>Cass.</i>	[<i>DC.</i>	Bridgesia, <i>Hook.</i>	Piptostemma,
Triptilion, <i>R. & P.</i>	Caloptilium, <i>Lag.</i>	Diaphoranthus,	[<i>Don.</i>
		[<i>Meyen.</i>	Trianthus, <i>Hook, f.</i>

SUB-TRIBE 2. TRIXIDÆ.—*Heads more than five-flowered. All the scales of the cylindrical involucre flat, or more or less keel-shaped; the exterior series more than five.*

GENERA AND SYNONYMES.

Pamphalea, <i>Lag.</i>	Martrasia, <i>Lag.</i>	Chabræa, <i>DC.</i>	Ptilurus, <i>Don.</i>
Ceratolepis, <i>Cass.</i>	Moscharia, <i>R. & P.</i>	Bertolonia, <i>DC.</i>	Dumerilia, <i>Less.</i>
Cephalopappus,	Moschifera, <i>Mol.</i>	Frageria, <i>DC.</i>	Trixis, <i>P. Br.</i>
[<i>N. & M.</i>	Moscaria, <i>Pers.</i>	Cassiopea, <i>Don.</i>	Prionanthes,
Pleocarphus, <i>Don.</i>	Mosigia, <i>Sp.</i>	Clarionea, <i>Lag.</i>	[<i>Schrank.</i>
Pentanthus,	Gastrocarpha,	Clariona, <i>Sp.</i>	Tenoria, <i>Bert.</i>
[<i>H. & Arn.</i>	[<i>Don.</i>	Drozia, <i>Cass.</i>	Eutrixis, <i>H. & Arn.</i>
Jungia, <i>L. f.</i>	Leuceria, <i>Lag.</i>	Chaetanthera,	Cleantes, <i>Less.</i>
Trinaete, <i>Gärt.</i>	Leuchæria, <i>Less.</i>	[<i>H. B. K.</i>	Platycheilus, <i>Css.</i>
Rhinaetina, <i>W.</i>	Martrasia, <i>Sp.</i>	Perezia, <i>Lag.</i>	Holocheilus, <i>Css.</i>
Dumerilia, <i>Lag.</i>	Lasiorrhiza, <i>Lag.</i>	Bowmannia, <i>Gardn.</i>	Dolichlasium, <i>Lag.</i>

Perezia, <i>DC.</i>	„ Clarionea, <i>Cass</i>	Acourtia, <i>Don.</i>	Maerachænium,
Homoianthus, <i>DC.</i>	Scelymanthus, <i>W.</i>	Perezia, <i>Ll. & L.</i>	[<i>Ik. f.</i>
Isanthus, <i>DC.</i>	Homœanthus, <i>Les</i>	Pogonura, <i>DC.</i>	Eizaguerrea, <i>Rémy.</i>
Homanthis, <i>Kth.</i>	Chætanthera, <i>Sp.</i>	Caloseris, <i>Benth.</i>	

SUB-ORDER III. — LIGULIFLORÆ, Fig. 133, c.

Flowers all strap-shaped, hermaphrodite.

TRIBE 8. *Cichoriæ*.—Arms of the style slender, obtuse, uniformly hairy; the stigmatic lines terminating near the middle, Fig. 134, A. Corolla split on the interior side, and therefore strap-shaped, flat, five-toothed, five-nerved, or, by the nerves being forked at the base, they are six-nerved. Pollen rough, angular, often in the form of a dodecahedron. Plants milky, with opposite leaves.

SUB-TRIBE 1. *SCOLYMIDÆ*.—*Receptacle chaffy. Pappus crown-shaped or chaffy. Spiny plants with yellow flowers. Heads bracteate.*

GENERA.

Scelymus, *Cass.*
 Myscolus, *Cass*
 Diplostemma, *H. & St.*

SUB-TRIBE 2. *LAMPSANIDÆ*.—*Receptacle naked, not chaffy. Seed-nuts without pappus. Plants not spiny. Almost all annuals; flowers yellow.*

GENERA AND SYNONYMES.

Lampsana, <i>Vaill.</i>	Hispidella, <i>Barnades.</i>	Rhagadiolus, <i>T.</i>
Lapsana, <i>T.</i>	Apogon, <i>Elliot.</i>	Kölpinia, <i>Pall.</i>
Soldevilla, <i>Lag.</i>		

SUB-TRIBE 3. *HOSERIDÆ*.—*Receptacle naked, not chaffy. Pappus either crown-like, or with many entire chaffy scales. Herbs, rarely shrubs. Flowers yellow or blue, as in Cichorium and Catananche.*

GENERA AND SYNONYMES.

Arnosoris, <i>Gärt.</i>	Catananche, <i>T.</i>	Drepania, <i>Juss.</i>	Adopogon, <i>Neek.</i>
Hedynois, <i>T.</i>	Hænseler, <i>Boiss.</i>	Swertia, <i>Ludew.</i>	Luthera, <i>Ch. Sch.</i>
Hyoseris, <i>L.</i>	Acanthophyton,	Chatelania, <i>Nek.</i>	Microseris, <i>Don.</i>
Achyrastrum,	Cichorium, <i>T.</i>	Schmidtia, <i>Mon.</i>	Bellardia, <i>Colla.</i>
[<i>Neck.</i>	Calais, <i>DC.</i>	Aethionia, <i>Don.</i>	Lepidomena,
Calodonta, <i>Nutt.</i>	Hymenonema <i>Ik</i>	Polychætia, <i>Taw.</i>	[<i>F. & M.</i>
Aposoris, <i>Neck.</i>	Uropappus, <i>Nutt</i>	Krigia, <i>Schreb.</i>	Fichteia, <i>C.H. Sch</i>
Leontodontoides,	Scorzonella, <i>Nutt.</i>	Troximon, <i>Gärt.</i>	Harpachæna, <i>Bnge.</i>
[<i>Mich.</i>	Toplis, <i>Ad.</i>	Cynthia, <i>Don.</i>	

SUB-TRIBE 4. *HYPOCHLERIDÆ*.—*Receptacle chaffy. Pappus scaly, the scales very narrow, semilanceolate, often pinnate. Herbaceous plants with yellow flowers.*

GENERA AND SYNONYMES.

Oreophila, Don.	Achyrophorus, Scop.	„ Rodigia, Sp.	Robertia, DC.
Amblachanium,	Poreellites, p. Cass.	Piptopogon, Cass.	Metabasis, DC.
[Turcz.]	Seriola, Gärt.	Agénora, Don.	Phalacroderis, DC.
Cynosseris, Endl.	Achyrophorus,	Poreellites, p.	Fabera, C. H. Sch.
Hypochaeris, L.	[Vaill.]	[Cass.]	

SUB-TRIBE 5. SCORZONERIDÆ.—*Receptacle naked. Pappus scaly, and the scales rough or feathery.*

GENERA AND SYNONYMES.

Thrinicia, Roth.	Oporinia, Don.	Tragopogon, L.	Galasia, Cass.
Colobium, Roth.	Phyllopappus, Wbp.	Hymenonema, Cass.	Microderis, DC.
Strepera, Schltz.	Millina, Cass.	Scorzonera, L.	Pieris, L.
Leontodon, L.	Geropogon, L.	Lasiospora, Cass.	Mediceusia, Mön.
Virea, Ad.	Podospermum, DC.	Lasiospermum,	Spitzelia, Schltz.
Antodon, Neek.	Richardia, Roth.	[Fisch.]	Deckera, Schultz.
Apargia, Less.	Urospermum, Juss.	? Fleischeria, St.	Helminthia, Juss.
Fidelia, Schltz.	Arnopogon, W.	Anisocoma, Torrey.	Kalbfussia, Schltz.

SUB-TRIBE 6. LACTUCIDÆ.—*Receptacle naked or rarely chaffy. Pappus hairy, silvery, and very fugacious.*

GENERA AND SYNONYMES.

Picridium, Desf.	Brachyrampus,	Mierorhynchus,	Paloya, Cass.
Reichardia, Roth.	[DC.]	[Less.]	Lepidoseris, Rehb.
Zollikoferia, DC.	Lactuca, L.	Ammoseris, Endl.	Ægoseris, Rehb.
Sonchus, L.	Scariola, Endl.	Launca, Cass.	Anisoderis, Cass.
Leptoseris, Nutt.	Rhabdotheca, Cass.	Trochoseris, Pöpp.	Rodigia, Sp.
Trachodes, Don.	Cyanoseris, Koch.	Macrorhynchus,	Ammogeton, Schrö.
Heterachena,	Chondrilla, T.	[Less.]	Crepis, L.
[Fresn.]	Crinissa, Don.	Macrorhynchium	Phæcasium, Cass.
Malacothrix, DC.	Pyrrhopappus,	[Rehb.]	Brachydera, Cass.
Youngia, Cass.	[DC.]	Kymapleura, Nutt.	Intybellia, Monn.
Prenanthes, Gärt.	Taraxacum, Juss.	Cryptopleura, Nutt.	Catonia, Cass.
Nabalus, Cass.	Leontodon, Ad.	Stylopappus, Nutt.	Ætheorhiza, Cass.
Harpalyce, Don.	Willemetia, Neek.	Troximeria, Nutt.	Calliopea, Don.
Esopon, Raf.	Calycosorus,	Lagosseris, Bieb.	? Troximonia, Don.
Lygodesmia, Don.	[Schmidt.]	Pterotheca, Cass.	Berinia, Brign.
Atalanthus, Don.	Wibelia, Hoppe.	Trichoerepis, Vis.	Brochyderia,
Erytheremia,	Peltidium, Zoll.	Crepinia, Rehb.	[Cass.]
[Nutt.]	Aspideum, Zoll.	Intybellia, Cass.	Phæcasium, Cass.
Pleiacanthus,	Zollikoferia, Nees.	Myoseris, Link.	Homalocline, Endl.
[Nutt.]	Ixeris, Cass.	Pachylepis, Less.	Omalocline, Cass.
Chorisma, Don.	Zacyntha, T.	Sclerolepis, Mon.	Crepidium, Nutt.
Chorisis, DC.	Nemauchenus, Cass.	Barkhausia, Mön.	Dianthoseris,
Phœnixopus,	Endoptera, 2, DC.	Borkhausia, Boch.	[C. H. Sch.]
[Koch.]	Gatyna, Cass.	Hostia, Mön.	Calycoseris, A. Gr.
Myecelis, Cass.	Endoptera, 1, DC.	Deloderium, Cass.	Acanthocephalus,
Phænopus, DC.	Lomatolepis, Cass.	? Closirospermum	[Fisch.]
Malanoccris, Denc.	Rhabdotheca, Cass.	[Neck.]	

SUB-TRIBE 7. HIERACIDÆ.—*Receptacle naked. Pappus hairy, rigid, and fragile, very often dirty brown, or yellowish.*

GENERA AND SYNONYMES.

Rothia, <i>Schreb.</i>	Miegia, <i>Neck.</i>	Galathenium, <i>Nutt.</i>	Picrosia, <i>Don.</i>
Voigtia, <i>Roth.</i>	Plancia, <i>Neck.</i>	Anisoramphus, <i>DC.</i>	Malacomëris, <i>Nutt.</i>
Heteracia, <i>F. & M.</i>	Aracium, <i>Neck.</i>	Soyeria, <i>Moun.</i>	Agoseris, <i>Raf.</i>
Andryala, <i>L.</i>	Stenotheca, <i>Mon.</i>	Catonia, <i>Mön.</i>	Troximon, <i>Nutt.</i>
Eriophorus, <i>Vail.</i>	Dubyæa, <i>DC.</i>	Lepicaune, <i>Lepey</i>	Pinaropappus, <i>Less</i>
Leucoseris, <i>Nutt.</i>	Lasiopus, <i>DC.</i>	Hapalostephium,	Dendroseris, <i>Don.</i>
Apargidium <i>Torrey</i>	Mulgedium, <i>Cass.</i>	[<i>Don.</i>]	Rhea, <i>Bertero.</i>
Hieracium, <i>T.</i>	Agathysus, <i>Don.</i>		

GENERA, THE POSITION OF WHICH IS DOUBTFUL.

Anisopappus,	Dolichogync, <i>DC.</i>	Trimetria, <i>Moç.</i>	Metazanthus, <i>Meyn.</i>
[<i>H. & Arn.</i>]	Elachia, <i>DC.</i>	Odontotrichum, <i>Zuc</i>	Synecephalantha,
Arrowsmithia, <i>DC.</i>	Gnaphalopsis, <i>DC.</i>	Ophryosporus,	[<i>Bartl.</i>]
Cadiscus, <i>E. Mey.</i>	Psilotrophe, <i>DC.</i>	[<i>Meyen.</i>]	Piptocarpha, <i>R.Br.</i>

GENERA, ALTOGETHER DOUBTFUL.

Apatanthus, <i>Viv.</i>	Mnesition, <i>Raf.</i>	Galophthalmum,	Glyphia, <i>Cass.</i>
Abasoloa, <i>Ll. & L.</i>	Microspermum <i>Lag</i>	[<i>Nees.</i>]	Glycideras, <i>Cass.</i>
Allendca, <i>Ll. & L.</i>	Platzia, <i>R. & P.</i>	Damatris, <i>Cass.</i>	Gibbaria, <i>Cass.</i>
Galeana, <i>Ll. & L.</i>	Placus, <i>Lour.</i>	Dimerostemma, <i>Cas</i>	Munnozia, <i>R. & P.</i>
Rosalesia, <i>Ll. & L.</i>	Onopix, <i>Raf.</i>	Serinia, <i>Raf.</i>	Hysteronica, <i>W.</i>

UNDESCRIBED GENERA.

Bracheilema, <i>R. Br.</i>	Oteiza, <i>Llav.</i>	Lasiocephalus, <i>Schlecht.</i>
Gomezia, <i>Llav.</i>	Koanophyllum, <i>Arrud.</i>	Trichostemma, <i>R. Br.</i>

GEOGRAPHICAL DISTRIBUTION.—The Composite flowers are found in every country in the world; their number diminishes towards the poles, and slightly also towards the equator. They are met with frequently in the temperate and warmer regions, but they grow very plentifully in the tropical and sub-tropical islands, and in the tracts of continent not far from the sea-shore. America is rich in species. The herbaceous are found in temperate and cold climates, the shrubby in warmer, and the arborescent in the tropical and antartic islands. The greater part of the Tubulifloræ are between the tropics; the Ligulifloræ are most frequent in the temperate parts of the northern hemisphere; and the Labiatifloræ are rare in America north of the tropics, but plentiful to the south.

PROPERTIES AND USES.—This is not only one of the most natural families, and most uniform in structure, but there is also a great similarity existing in the properties of the plants of which it is composed. Generally speaking, all the Composite flowers are tonic or stimulant in their medical virtues, and these two virtues sometimes exist in the same plants. The active principles which predominate in these plants are a bitter extractive or milky principle, and a very fragrant volatile oil, which is often solid, concrete, and almost identical with camphor. Some yield a colouring matter, used in the arts, as the Safflower; and others, like the Sunflower, furnish an abundance of fixed oil. Among esculent vegetables we find the Lettuce, Scorzonera, Salsify, Cardoon, and Artichoke, belonging to the family; as also Endive and Chicory, the root of the latter being that which is now so extensively used along with coffee. Here we have also the noble Dahlia,

the stately Sunflower, and the pretty Marigolds, along with a host of other floral beauties which adorn our gardens and shrubberies.

Common Wormwood (*Artemisia absinthium*) is a native of Britain, and is common in almost every part of Europe, in rocky places, by roadsides, among rubbish; and it is cultivated in the herb-gardens of England for its medicinal properties. The leaves and flowering tops are bitter, and the roots are warm and aromatic; but it is the former which are most employed. They should be gathered in July and August, when the plant is in flower, and then dried, to be had in reserve when wanted. The whole plant has a strong, penetrating odour, with an extremely bitter and aromatic taste, and these properties are extracted by water or alcohol. It yields, by distillation, a dark-green volatile oil, on which the odour depends, and which has been used both externally and internally to destroy worms. The quantity of oil the plants yield depends very much on soil and season, there being instances where ten pounds of the plant have yielded two ounces of oil, and others where twenty pounds gave little more than one ounce. The constituents of the plant, according to Braconnot, are—a very bitter and an almost insipid azotized matter, 26; an excessively bitter resinous substance, 1.4; a green volatile oil, 0.09; chlorophylle, a trace; albumen, 7.5; starch, 1; saline matters, 7.5; and lignin, 55 parts. The same chemist discovered among the saline matters an acid which he thought to be peculiar, and which he called *absinthic acid*, but it was subsequently found to be identical with succinic acid. The substance formerly called *Salt of Wormwood* is impure carbonate of potassa, obtained by lixiviating the ashes of the plant. Caventou obtained a very bitter, imperfectly crystallizable substance, which he considered as the active principle, and proposed for it the name of *Absinthin*. The properties of Wormwood are those of a powerful tonic and stimulant. It reanimates the enfeebled action of the stomach, whether arising from chronic leucorrhœa, or amenorrhœa dependent on debilitating causes; and for weakened conditions of the stomach generally, it formerly enjoyed a specific reputation. Before the introduction of Peruvian Bark, it was administered in the treatment of intermittents. A narcotic property is supposed to reside in the volatile oil, which occasions headache, and, when long continued, produces a disordered state of the nervous system; and therefore, when long used or employed in large doses, the decoction is preferable to the infusion or powder. Linnæus mentions two cases wherein an essence made from the plant, and taken for a considerable time, prevented the formation of stones in the kidneys and bladder, the patients forbearing the use of wine and acids. An infusion of it given to women nursing makes the milk bitter, and it gives a bitterness to the flesh of sheep which feed upon it. The plant steeped in boiling water and repeatedly applied to a bruise, will remove pain in a short time, and prevent the swelling and discolouration of the part. The leaves put into sour beer destroy the ascency; they resist putrefaction, and hence their use in antiseptic fomentations. The whole plant is considered vermifuge, and as such has long been a popular remedy in this country: hence the derivation of the English name. In Germany it is used in making beer, as a substitute for the hop; and if put into beer during summer, it prevents it from turning sour. In Switzerland a liqueur called *Crème d'Absinthe* is prepared with it, and also with *A. mutellina* and *A. spicata*, which is much esteemed, notwithstanding its bitter flavour, as an ex-

cellent stomachic. A syrup is also prepared from the plant, which is used in France as a stomachic and vermifuge.

Southernwood, so common in gardens under the name of *Old Man*, and so great a favourite in rustic nosegays, is *Artemisia abrotanum*, a native of the south of Europe and the East. It is bitter and aromatic, with a strong and rather agreeable exhilarating smell, and was formerly used as a vermifuge and tonic; and in catarrhal fevers it may have great efficacy by its qualities of promoting perspiration, which it has in an eminent degree. *A. pontica*, called *Roman Wormwood*, is not so bitter as the common, being so mixed with a sort of aromatic flavour as not to be disagreeable. *Mugwort* is a well-known weed growing abundantly in Britain, by way-sides, on ditch-banks, the borders of fields, and in waste places. It is called *Artemisia vulgaris* of botanists, and was formerly extolled for its efficacy in uterine disorders, and hysteria, for which purposes infusions of it were drunk as tea. Dr. Home administered, to a woman afflicted with hysteria for many years, a drachm of the leaves in powder four times a day, and in a few days the fits ceased. Dr. Burdach, a German physician, has of late years revived the old application of the use of the root as a remedy in epilepsy. For this purpose it is collected in autumn or early in spring, and the side-roots only dried for use. These are powdered as they are wanted, and the ligneous portion rejected. The dose is about a drachm, to be administered in some warm vehicle when the paroxysm is expected, and to be repeated at intervals of half an hour, till perspiration is produced, the patient being confined to bed. A decoction of it is taken by the common people to cure the ague. In Japan, Thunberg states that the woolly part of the leaves of this plant is used as tinder; and from it also the different kinds of *Moxa* are prepared. "The leaves are gathered in June, and afterwards dried; they are then beaten and rubbed till the woolly part is obtained pure. It takes fire very readily, and consumes slowly; and when a small ball of it is laid on any part of the body, and set fire to, it burns down into the skin, forming ulcers of different depths, which some time after act as drains for carrying off the humours that have flowed to them from different parts. The back is the chief place for the application of this universal remedy; and although there are but few maladies in which it is not used, yet it has the best effect in rheumatism and colds. Neither sex, age, nor situation in life, exempts any one from the necessity of its use." For the same purpose, *A. chinensis*, *A. indica*, and *A. moxa*, are used. The Chinese call the former the Physician's herb, and employ it in hemorrhages, dysenteries, pleurisies, and disorders of the stomach; girdles of the down are recommended in sciatica; and those who are afflicted with rheumatism in their legs quilt their stockings with it. In some countries the young plant is used as a culinary aromatic.

Tarragon, called *Artemisia dracunculus*, is a native of Siberia and Tartary, and has long been cultivated in gardens as one of the aromatic herbs. It is frequently used to improve the flavour of soups and salads, having a smart, pungent, and agreeable odour, and a pungent, slightly acrid, and aromatic taste; it creates an appetite, and dissipates flatulency. The leaves make an excellent pickle, and communicate that agreeable flavour to vinegar which is so highly esteemed. The Persians use it very generally at their meals to excite an appetite. Several species of *Artemisia* furnish the drug

called *Semen Contra*, or *Worm-seed*. Of these are *A. judaica*, *A. Sieberi*, *A. Lercheana*, *A. contra*, and *A. pauciflora*. The heads, the fruit, and the superior extremities of the branches mixed, form the drug, which is of two kinds, known as *Worm-seed of the Levant* and *Worm-seed of Barbary*, and the first is the most esteemed. These products contain a volatile oil and a resinous extractive matter, to which their virtues have been ascribed. A peculiar principle has also been discovered in them, which has received the name of *Santonin*, and which, along with the products themselves, are celebrated for their vermifuge properties. *A. cærulascens*, which grows on the shores of the Mediterranean, furnishes the drug called *Semen scriphii*, or *Barbotine*. It is the flower-heads which are used for the purpose, and they are regarded as an excellent vermifuge.

Common Tansy (*Tanacetum vulgare*) grows wild in Britain, in meadows and pastures, on the banks of rivers and in swampy places. It is cultivated in gardens as a pot-herb for seasoning, and in the herb-grounds for use in medicine. The flowering tops are the parts used. The plant emits a strong, peculiar, fragrant odour, and has a warm, bitter, somewhat acid, and aromatic taste, properties which are communicated to water and to alcohol. It has been regarded as one of the aromatic bitters, and as such has been recommended in hysteria amenorrhœa and intermittents; it is also employed as a vermifuge. The leaves of Tansy contain a volatile oil, fixed oil, wax or stearin, chlorophyll, yellow resin, yellow colouring matter, tannic and gallic acids, bitter extractive, gum, lignin, and a peculiar acid, called by Peschier *tanaetic acid*, and which precipitates lime, baryta, oxide of lead, and oxide of copper. *Costmary*, or *Pyrethrum tanaetum*, is a native of the south of Europe. The whole plant has a strong aromatic and agreeable odour, and a bitter, warm taste, from which it has been regarded as stimulant and very energetic. It formerly enjoyed great reputation as an anti-spasmodic, and, macerated in oil, it formed oil of balm, so much used for applying to wounds, and particularly to contusions.

The *Milfoils* contain an essential oil and a bitter resinous substance. *Common Milfoil* (*Achillea millefolium*), or *Yarrow*, possesses these properties in as great a degree as any of the species. It is very common in pastures and by road-sides in this country, and was long considered as a noxious weed; but of late years it has been recommended in mixtures of artificial grasses for permanent pasture. The whole plant is medicinal. Both the flowers and leaves have an agreeable, though feeble, aromatic odour, which continues after drying, and a bitter, astringent, pungent taste. The aromatic properties are strongest in the flowers, the bitter in the leaves. The virtues are owing to a volatile oil, a bitter extractive, and tannin. It contains also a peculiar acid, called *achilleic acid*. The oil is obtained by distillation, and is of a beautiful azure-blue colour, with the peculiar flavour of milfoil. In former times, the plant was greatly esteemed as a vulnerary; and it is still esteemed as a mild aromatic tonic and stimulant. In the province of Dalcarlia, in Sweden, the inhabitants use it in the making of beer, as a substitute for hops, in order to increase its intoxicating powers. The Scotch Highlanders make an ointment of it, which dries and heals wounds. *A. ageratum* is the *Sweet Maudlin*, and grows abundantly in the south of Europe. It has a sweet smell, and a bitter, aromatic taste; but though at one time regarded as medicinal, it is not now considered to possess any

properties worthy of notice. *Ptarmica vulgaris*, or *Sneezewort*, is also a native of Britain, growing in moist meadows, by the sides of ditches, and in shady woods. The plant is slightly odorous; the taste of its leaves is feebly aromatic and somewhat acrid, having a resemblance to that of Tarragon. Its root and leaves, dried and reduced to powder, are frequently employed, like snuff, to excite sneezing; and its root, when bruised, acts on the salivary glands, and has been applied in cases of toothache. The young, tender shoots are put into salads to correct their coldness. *P. nana* and *P. atrata* are substituted for the true genipi, which is *P. moschata*, but all are used by the Swiss mountaineers as tea, and the last, particularly, is esteemed as an excellent sudorific, and as furnishing the liqueur *Espril d'Iva*.

Some of the plants of this family secrete an essential oil, which in some cases is acrid, and in others bitter, and it is more particularly in the heads of the flowers that it is found. Of these, the most celebrated is *Chamomile* (*Anthemis nobilis*), a native of the continent, but extensively cultivated in the herb-gardens of this country for the supply of druggists. Chamomile is of two varieties, the single and the double-flowered; but though the latter is frequently preferred, the former is more powerful, and possess in the greatest degree the essential properties of the plant. It is the flowers which are used, and they are well-known for their tonic properties. Sometimes they are applied externally, in the form of fomentations, in cases of irritation or inflammation of the bowels, and as an excitant in ulcers. The constituents of the flowers are a volatile oil, a bitter principle, resin, and a small quantity of tannin; and it is supposed that the two first are the bases of the active principles. Similar in properties to chamomile are *Matricaria chamomilla*, or *German Chamomile*, *Pyrethrum parthenium* (*Common Feverfew*), and *Anthemis arvensis* (*Corn Chamomile*). Another plant with similar properties is *Mayweed*, or *Stinking Chamomile* (*Anthemis cotula*). The whole plant has a very disagreeable odour, and a warm, bitter taste; and when the fresh plant is handled, it blisters the skin, from a peculiarly acrid juice which it contains. The flowers of *Santolina fragrantissima*, a shrub growing in Egypt and the East, are aromatic, and are used in the same way as those of chamomile. The root of *Anacyclus pyrethrum*, or *Pellitory of Spain*, is used as a masticatory to relieve toothache; it enters into the composition of certain snuffs, and the powder is extensively used by the Mohammedans to excite transpiration, by rubbing it on the skin. The taste of the root is peculiar; slight at first, but afterwards acidulous, saline, and acrid, attended with a burning and tingling sensation over the whole mouth and throat, which continues for some time, and excites a considerable flow of saliva. Dr. O'Shaughnessy states that he knew of two remarkable cases of spontaneous salivation of the most obstinate form, which, after resisting every other treatment for more than three months, were effectually cured by this root. Pellitory is a powerful irritant, used almost exclusively as a sialagogue in certain forms of headache, rheumatic and neuralgic affections of the face, and toothache, or as a local stimulant in palsy of the tongue or throat, and in relaxation of the uvula. By analysis, it yields 0.59 of a brown, very acrid substance; 1.60 of a very acrid fixed oil, soluble in potassa; 0.35 of a yellow acrid oil, also soluble in potassa; traces of tannin; 9.40 of gum; inulin; 7.60 of sulphate and carbonate of potassa, chlorido of potassium, phosphate and carbonate of lime,

aluminia, silica, &c.; and 19·80 of lignin. *Spilanthes oleracea*, called *Para Cress*, is a native of Brazil. The whole plant is very acrid, but the heads have a burning and caustic flavour, and powerfully excite salivation. An alcoholic tincture of it is employed against toothache; it acts like horse-radish, but a degree more intensely, in inflaming to a greater or less extent the whole length of the mucous membrane, and displacing irritation.

One of the plants most powerful in their action, belonging to this family, is *Arnica montana*, a native of the mountainous districts of the continent. It is called *Wolf's-bane*, or *Mountain Tobacco*, and furnishes a favourite drug among the homœopathists, under the name of arnica. The fresh plant has an odour so strong, as to excite sneezing in those who smell it, but this it loses by drying. Its taste, and particularly that of the root, is bitter, acrid, and nauseous, and these virtues are extracted by water. From an analysis of their flowers, they were found to contain gallic acid, gum, albumen, yellow colouring matter, an odorous resin, and a bitter principle, supposed to be identical with that found in the laburnum, and hence called *Cytisin*. This substance is yellow, of a bitter nauseous taste, deliquescent, readily soluble in water and diluted alcohol, but with difficulty in strong alcohol, and insoluble in ether. In a dose of five grains it is powerfully emetic and cathartic, and it is supposed to be the active principle of the plant. Pfaff discovered in the root a volatile oil, an acrid resin, extractive, gum, and lignin; and Mr. Wm. Bastick obtained an organic alkali from the flowers, which he named *Arnicinia*. This is solid, slightly bitter, but not acrid, of the odour of castor, slightly soluble in water, and much more so in alcohol and ether, and is decomposed by the caustic alkalis. Arnica is regarded as a stimulant, but of a particular kind. Thus, besides the excitement which it occasions in the digestive organs producing vomiting and purging, the brain and whole nervous system receives a more or less powerful impression, as is shown by the headache, spasmodic contraction of the limbs, and difficulty of respiration, which follow its use. The German physicians highly recommend the flowers and the root of arnica against intermittents, various nervous affections—such as paralysis and amaurosis; and Bergius has used it with advantage as a diuretic, diaphoretic, and emmenagogue. The infusion of the flowers of arnica enjoys a popular reputation on the continent as a remedy in cases of concussion of the brain occasioned by falls, and hence it received the name of *panacea lapsorum*. The leaves, dried and reduced to powder, are employed as snuff. In some parts of Switzerland it is collected for this purpose, and for smoking, instead of tobacco.

Similar in its properties to arnica is *Doronicum pardalianches*, or *Great Leopard's-bane*, a native of Great Britain. The root is aromatic, and is used by sportsmen against giddiness, as is also that of *D. plantagineum*. A popular remedy for chest complaints is found in *Elecampane* (*Inula helenium*), a showy plant, with a large yellow flower, growing wild in marshy places and by the sides of ditches in many parts of Britain. The root is the part used, and it has a faint aromatic odour, and a bitter, acrid, and somewhat camphoraceous taste. It is stimulant and tonic, and is often prescribed as an emmenagogue, diaphoretic, diuretic, and expectorant. Some administer it in catarrhs, when the inflammatory symptoms have disappeared. A peculiar principle, resembling starch, was discovered in Elecampane, and called *inulin*. It differs from starch in being deposited

unchanged from its solution in boiling water when the liquor cools, and in giving a yellowish instead of a blue colour with iodine. Besides this, Elecampane contains *helenin*, a concrete substance, intermediate in its properties between the essential oils and camphor, and separable by distillation with water; a bitter extractive, soluble in water and alcohol; a soft, acrid, bitter resin, having an aromatic odour when heated; gum; albumen; lignin; traces of volatile oil; a little wax, and various saline substances. A decoction of the root is said to cure the scab in sheep, and hence it has been called *Scab-wort*; and its name of *Horse-heal* is doubtless from similar virtues applied to horses. The root of *Pulicaria odora* is more aromatic, both in taste and smell, than that of Elecampane. The *Common Flea-bane* (*Pulicaria dysenterica*), found plentifully in moist meadows and watery places in many parts of England, has the reputation of being a powerful tonic in diarrhœa; and Linnæus states that it was from the circumstance of the Russian soldiers, in their expedition against Persia, being cured of dysentery by the use of this plant, that he gave it the specific name *dysenterica*. It is said by old authors to be called *Flea-bane* from its smoke driving away fleas and other insects when the plant is burned; and Forskal says it is named in Arabia *Rara ejub*, or *Job's Tears*, from a notion that Job used a decoction of this herb to cure his ulcers; and it was formerly recommended in the itch and other cutaneous disorders. *P. vulgaris* possesses the same properties.

Some species of *Eupatorium* have a considerable reputation as tonics, and as remedies in various diseases. *E. cannabinum*, or *Common Hemp-agrimony*, is a common plant in Britain, growing on the banks of running streams and stagnant waters. Its root was formerly used as a purgative, and the plant was administered in coughs, and also as a diuretic and vulnerary; but it is a coarse medicine, and ought not to be used indiscriminately. *E. purpureum*, called *Gravel-root* in the United States, is there considered a remedy in the disease which suggests its name. The root, which is the part used, is bitter, aromatic, and astringent, and is said to operate as a diuretic. *E. rigidum* has a taste like turpentine. *E. leucifolium* is a native of the United States, and is there called *Wild Horehound*; and an infusion of the plant has been found to act as a tonic, diaphoretic, and aperient. *E. villosum* has the flavour of wormwood. *E. ayapana*, a native of Brazil and India, enjoys great celebrity in the cure of fevers, cholera, tetanus, snake-bites, and other extraordinary cases; but all these romances are exploded when we know that its virtues are simply those of an agreeable and useful diaphoretic, and gentle tonic. *E. perfoliatum* grows abundantly in all parts of the United States, and is there called *Thorough-wort*, or *Bone-set*. It is there highly esteemed as a tonic and diaphoretic, and in large doses it is emetic and aperient. It is said to be used by the Indians in intermittent fevers; and taken as a warm infusion, so as to produce vomiting or copious perspiration, at the commencement of catarrh, it will frequently arrest that complaint; and it has been especially recommended in the treatment of influenza. *Nothites saturiæfolia* is said to possess the same wonderful virtues in the cure of the bites of serpents as are ascribed to *E. ayapana*, as does also *Mikania opifera* and *M. guaco*. *M. officinalis* is used among the Brazilians as a bitter aromatic, and as a substitute for cascarilla. *Baccharis genistelloides* and *Acanthospermum xanthioides*, natives of Brazil, are employed by the inhabitants as febrifuges.

Colt'sfoot has long enjoyed a popular reputation for the cure of coughs. It is called *Tussilago farfara*, and is, shall we say, too abundant, in moist clayey and marley soils, all over Great Britain. It may easily be known; as it is among our earliest spring flowers, throwing up, in March and April, its bare yellow flowers, which are succeeded some time afterwards by large, flat, woolly leaves. The leaves of *Colt'sfoot* have long been smoked for the cure of chest complaints, and they form the chief ingredient in *British Herb Tobacco*. The flowers are used in a state of infusion in cases of slight irritation of the bronchial membrane. These properties are, however, not regarded with any degree of confidence. Dr. Cullen found the leaves very serviceable in scrofulous cases; and where sea-water had failed, he found a decoction of them, after being dried, succeed. Fuller states the case of a girl with twelve scrofulous sores, who was cured by drinking daily as much as she could, for above four months, of the decoction of the leaves, made so strong as to be sweetish and glutinous. The cottony substance which is on the leaves is easily rubbed off, and when collected, dipped in a solution of saltpetre, and dried, makes excellent tinder. The leaves of *Butter-bur* (*Petisites vulgaris*) were formerly used to dress ulcers; and the flowers are said to be strongly diaphoretic, diuretic, and useful in asthma. The root has been used as a remedy against the tapeworm. Dr. O'Shaughnessy speaks in high commendation of the virtues of the leaves of *Kleinia nerifolia*, a native of India. The leaves resemble the tongue of a buffalo, and the stalks are prickly, and covered with white spots. While fresh, they have a strong smell, like hemlock, and are given in decoction in rheumatism, syphilis, and lepra, and, indeed, in all the class of cases in which sarsaparilla is usually employed by European practitioners. It is very common in the bazaars of India, and it has been proved to be very efficacious.

The *Common Sunflower* (*Helianthus annuus*), apart from its ornamental character as a conspicuous object in gardens and shrubberies, is also a much more important plant than it is generally supposed to be. In France, the leaves are used as forage for cattle, who are said to eat them with great relish and avidity. The stalks make an excellent fuel, and yield a large quantity of potash after they are burned; or, if not wanted for that purpose, the ashes may be used as manure, by sowing it over the land or mixing it in the manure heap. In Portugal, the seeds are used to make a wholesome and nutritious bread, and, when roasted, they form an excellent substitute for coffee; in some parts of the continent, a kind of bouilli is made of them, which serves as food for infants. They also yield, by expression, a fixed oil, little if at all inferior to olive oil, which is used in some parts of Europe both for burning in lamps and for other domestic purposes to which olive oil is applied, and for making soaps. As food for poultry, they have been found to be very nutritious. One acre will produce fifty bushels of seed, yielding fifty gallons of oil, and about 1,500 lbs. of oil-cake; and the stems will yield about ten per cent. of potash. The pith of the sunflower has been recommended by M. Percy for the preparation of moxa, for which it is well adapted by the nitre it contains enabling it to burn without being blown upon. The *Jerusalem Artichoke* (*H. tuberosus*) is also a plant well known as being cultivated for its tubers, not only as a garden vegetable, but also as an agricultural crop. By many it is much esteemed as an esculent, when cooked in various ways, and the domesticated animals eat both the fresh

foliage and the tubers with great relish. By some they are considered nourishing, and even fattening. According to the analysis of Braconnot, the constituents are—starch, 30; albumen, 10; uncrystallizable sugar, 148; gum, 12; fixed oil, 1; woody fibre, 12; inorganic matter, 27; and water, 770. From the seeds of *Guizotia oleifera*, a native of India, where it is called *Ram-til*, an oil is expressed, and for which the plant is cultivated in Mysore as well as in Abyssinia. *Madia sativa*, a native of Chili, is much cultivated in countries on the continent for the oil expressed from its seeds, which is very similar in appearance to almond and olive oil, and is used for the same purposes. By some it is regarded as inferior to both of these, and by others it is considered sweeter and more agreeable than olive oil. According to Braconnot, it is applicable to many economical uses, such as dressing cloths and the manufacture of soap. The cake which remains after the oil is expressed is eaten by cattle. The plant has a most disagreeable odour, and in some parts its culture has been limited on that account.

The *Dahlia*, now such an ornament in all gardens, is a native of Mexico, and the numerous varieties which the care of the florist has assisted in producing are derived from two single-flowered species, *D. variabilis* and *D. coccinea*. For some years after the introduction of the dahlia to Europe, the tubers were attempted to be cultivated as an esculent and for forage; but their flavour is not acceptable either to man or to the domesticated animals, although they contain a considerable quantity of nutritive matter. They are rich in an amylaceous matter called *Dahline*, which is identical with inulin, and differs in its properties from starch in changing to a yellow colour on being treated with iodine. The tubers also contain an essential oil, a bitter, aromatic substance, and are reported to possess sudorific and diuretic properties. A fine carmine colour is extracted from the flowers. With *Eclipta erecta* the women of Brazil dye their hair black. *Synchondendron ramiflorum* is a large tree fifty feet high, a native of Madagascar, and by the time of its flowering the natives indicate the season of rice-sowing.

The *Great Burdock*, or *Burr* (*Lappa major*), is a common plant on roadsides and among rubbish in waste grounds, and is known to every schoolboy by the hooked scales of the involucre, which enable the flower heads to adhere to the clothes of those on whom they are thrown, and also to the coats of animals. Its root has long enjoyed a popular medicinal reputation. It should be collected in the spring, and dried, when it has a weak, unpleasant smell, and a sweet, slightly bitter taste. Its properties are aperient, diaphoretic, and sudorific; and it has been recommended in gouty, scorbutic, venereal, rheumatic, scrofulous, leprosy, and nephritic affections. As a sudorific it is particularly efficacious, causing a free cutaneous transpiration. The root of the Great Burdock contains a great quantity of inuline, and it has been found to contain sugar, according to Fée, and also a mixture of tannin. Its virtues are very similar to those of sarsaparilla. The leaves have a harsh and bitter taste, the juice of which, when extracted and mixed with oil, forms an excellent liniment for the healing of wounds and ulcers. The young shoots of the plant, stripped of their outer skin, may be boiled and eaten as asparagus; and, on the continent, the boiled roots are eaten like those of salsify. The whole plant, after it has flowered, when burned in a hole made in the ground, without allowing

the flame to escape, was found to yield from three pounds of the ashes, one pound of alkali, equal to the best potash.

There are many other plants growing throughout Europe which possess properties similar to those of the Burdock, and held in high estimation, although not recognised by medical practitioners. *Cnicus benedictus*, known as the *Blessed Thistle*, a native of the south of Europe, and often met with in gardens in this country, is remarkable for the intense bitterness of its leaves, a decoction of which is excellent as a tonic, diaphoretic, or emetic. Its active constituents are volatile oil and a peculiar principle which has been named *enicin*. This is crystallizable, inodorous, very bitter, neither acid nor alkaline, scarcely soluble in cold water, more soluble in boiling water, and soluble in all proportions in alcohol. It consists of carbon, hydrogen, and oxygen, and is analogous to salicin in composition. In the dose of four or five grains, it is said often to cause vomiting. The *Milk Thistle* (*Silybum marianum*), or, as it is sometimes called, *Our Lady's Thistle*, was formerly considered a sovereign remedy in dropsy, chronic rheumatism, and even intermittents; but, as Ray says, it is more a garden vegetable than a medicinal plant. The young and tender stalks of the root-leaves, when stripped of their spiny part, are eaten like cardoons, or, when boiled, are used as greens. The young stalks peeled, and soaked in water to extract their bitterness, are excellent as a salad. The scales of the involucre are as good as those of the artichoke; and the roots, in early spring, are good to eat. The seeds supply food to many small birds; and it is from the gold-finch feeding so extensively on them that it has been called *Carduelis*. The leaves are beautifully marked with white milky veins and blotches, which, according to Roman Catholic tradition, were occasioned by the plant being sprinkled with the milk of the Virgin Mary! The *Cotton Thistle* (*Onopordum acanthium*) is that large, handsome plant grown in gardens under the name of *Scotch Thistle*. It is a native of Britain, and may sometimes be found on dry banks in waste places near habitations. The flowers have been used to coagulate milk; the receptacle is eaten like that of the artichoke, and the tender stalks like those of the cardoon. The *Creeping Thistle* (*Cirsium arvense*), that pest of the farmer, so common in corn-fields, especially on strong soils, is useful in scirrhus tumours, and yields a sort of galls. The distilled water of *Corn Blue-Bottle* (*Centaurea cyanus*) was at one time so highly esteemed as an application to weak eyes, that the plant received the popular name of *Break your spectacles*. The expressed juice of the neutral florets makes a good ink, and it also stains linen of a beautiful blue, which, however, is not permanent. The juice of the central florets, with the addition of a very small quantity of alum, makes a lasting transparent blue, not inferior to ultramarine. The root of *Centaurea behen*, called *White Ben*, is cordial, and that of *C. cerinthefolia* is tonic. The plant and root of *Star Thistle* (*C. calcitrapa*) are very bitter, and are said to have been used by brewers as a substitute for hops.

Cartina acaulis, common in alpine districts in Switzerland, Italy, Germany, and the south of France, contains, in the bark of its underground stem, a resinous substance and a bitter, caustic, essential oil, which was formerly administered in various diseases, and which, in large doses, acts as a drastic purgative. The root is considered restorative and useful after great fatigue, when proper refreshments cannot be procured. Formerly it

was in common use among military men. *C. vulgaris* possesses somewhat similar properties, but in an inferior degree. *C. gummifera*, which grows on the coast of the Mediterranean, abounds in a gum-resin, which flows from the neck of the roots and from between the scales of the involucre, in tears similar in appearance and substance to those of mastich; and it was chewed by the ancients as a remedy against the tapeworm. The fresh root is said to be poisonous both to man and beast; but the fleshy receptacle or the flowers is preserved with honey or sugar, and eaten as a sweetmeat. The dried involucre serves as an excellent hygrometer. In fine weather, it opens horizontally, and is even turned back; but on the approach of wet, it becomes quite closed. This is called *Carline Thistle*, and grows in dry meadows and pastures in Britain. *Aucklandia costus* is a native of northern India, and is the plant which is supposed to have furnished the costus of the ancients. The roots have a strong pungent odour, and are burned as incense in the temples. The plant is employed in Cashmere to protect the bales of shawls from the attacks of moths. The root of *Cardopatum corymbosum*, a plant growing along the shores of the Mediterranean, is one kind of the article sold in shops on the continent under the name of costus; but the true *costus*, or *cost*, of the Arabians and of India, is, doubtless, the root of *Aucklandia costus*.

The *Artichoke* (*Cynara scolymus*) and the *Cardoon* (*C. cardunculus*) are well-known garden plants, and the uses to which they are applied are too familiar to every one to require repetition here; but it may not be generally known, that the leaves and expressed juice of the former are very bitter, actively diuretic, and have long had a reputation for the cure of dropsies. A tincture and extract prepared from the leaves have been recommended in rheumatic, gouty, and neuralgic affections. The flowers are said to curdle milk, and the plant to yield a good yellow dye. *Safflower*, so much used by dyers, is *Carthamus tinctorius*, a native of Egypt and the Levant. The florets constitute the drug of commerce, and for these the plant is extensively cultivated in the south of France, Spain, Italy, the Levant, and southern Germany. When in full flower, the florets are gathered and submitted to pressure, when they are formed into cakes. Safflower furnishes two very important principles in dyeing, one of which is red, insoluble in water, slightly soluble in alcohol, very soluble in alkaline liquids, and called *Carthamine*, or *carthaminic acid*; the other yellow and soluble in water; but it is on the former that the value of safflower as a dye-stuff depends. Carthamine, mixed with finely powdered talc, forms the *rouge* with which ladies are said to represent colour in their cheeks. Used medicinally, safflower has been employed in domestic practice, as a substitute for saffron, in measles, scarlatina, and other diseases, in order to promote the eruption. The seeds are slightly purgative, and have been used in dropsy; and the Egyptians express an oil from them, which they burn in lamps. The seeds of *C. persicus* are eaten whole in times of scarcity, and yield, by expression, a useful oil, which is eaten, and the cake forming the residue is a nutritive food for cattle. The leaves are boiled and eaten as greens. *Common Saw-wort* (*Serratula tinctoria*), a native of thickets and pastures in Britain, also yields a colouring matter, and, according to Linnæus, is much used in Sweden to dye coarse woollen cloths yellow. The *Common Marigold* (*Calendula officinalis*) has for centuries been cultivated in the gardens of

this country both for the beauty of its flowers and as a pot-herb; for the latter purpose, its flowers formed an ingredient in soups; from an idea that they comforted the heart and spirits. The whole plant exhales a slightly sweet and aromatic odour, and a bitter, somewhat acrid taste. Among its constituents is a peculiar principle, called *calendulin*, discovered by Gieger, most abundant in the flowers, and considered by Berzelius analogous to bassorin, though soluble in alcohol. It was formerly considered antispasmodic, sudorific, deobstruent, and emmenagogue, but, as such, it is now considered of little value.

The leaves of *Prinzia aromatica*, a native of the Cape of Good Hope, is used by the settlers as a substitute for tea; and those of *Anandria discoidea* are employed by the Chinese in the same way as those of Colt'sfoot are in this country. A decoction of *Trivis braziliensis* is said to be drunk by the Brazilian women as a remedy against amenorrhœa. *Moscharia pinnatifida* grows abundantly on the coast of Chili, and has the odour of musk. *Flotovia diacanthoides*, called *Palo blanco* in Chili, is a large tree, the wood of which is white and very durable.

The plants having flowers with strap-shaped florets contain many of importance. They all abound in a milky juice, with various substances which are more particularly bitter, resinous, saline, and narcotic. Many of them, while yet young, and before they have secreted these substances, are eatable and agreeably flavoured. The *Dandelion* (*Taraxacum Dens Leonis*), if blanched and eaten young, makes an excellent salad. It is sufficiently abundant, and we are sometimes surprised it is not more used than it is, considering the valuable properties it possesses. When the leaves have attained maturity, they are considered medicinal, and serve the purpose of tonics. But it is in the root that the greatest virtue resides. When dried, the root has a somewhat sweet, mucilaginous, and bitter taste. The milky juice was found, on analysis, to contain bitter extractive, gum, caoutchouc, saline matter, a trace of resin and a free acid, starch or inulin, and saccharine matter. Mannite is found in the infusion, but does not exist in the root, and is formed by spontaneous changes consequent on exposure. A peculiar crystallizable principle was discovered in the juice by M. Pollex, which he called *taraxacin*. It is bitter and somewhat acrid, fusible, but not volatile, sparingly soluble in cold water, but very soluble in boiling water, alcohol, and ether. Formerly, the root of Dandelion was highly esteemed as a diuretic, and hence the common name of *Piss-a-bed*. It is now regarded as slightly tonic, diuretic, and aperient, and also as having a specific action on the liver, exciting it, when languid, to secretion, and resolving its chronic engorgements. In congestion and chronic inflammation of the liver and spleen, in cases of suspended or deficient biliary secretion, and in dropsical affections dependent on obstruction of the abdominal viscera, it has a marked effect, if employed with a due regard to the degree of excitement. When roasted and ground, it makes an excellent substitute for coffee; and on one occasion, when locusts had devoured the harvest in the island of Minorca, the inhabitants subsisted on this root. The extract of the root is said to act with effect in diseases of the liver induced by long residence in India, the dose being three to ten grains three times a day.

An article which has come into extensive use during the last few years in this country, is the root of *Chicory*, or *Succory* (*Cichorium intybus*). It

has long been employed on the Continent both for mixing with, and as a substitute for coffee. In Belgium it is very generally used as such, in a pure state. The plant is very common, in a wild state, in England, and its lovely blue flower may vie with some of the more vaunting beauties of the flower garden. But in some parts of the country it is cultivated very largely for its herbage and roots,—the former as food for cattle, and the latter as an article of commerce. When the roots are well grown, they have the appearance of immense white carrots, and the general crop is from three to five tons per acre. After being dug up they are washed, and cut up into pieces about half an inch in length, and these are placed in a kiln till they are dried, after which they are ready for roasting, grinding, and the other processes, to fit them for the purposes to which they are generally applied. The plant is also cultivated in gardens, for its young and tender leaves, which are used as a salad. It is gently tonic, without being irritating, and is by some considered aperient and deobstruent. When taken in quantity, it is said to be useful in congestion of the liver, jaundice, and visceral obstructions, and is even said to have been used with effect in consumption. The plant so much used as a salad, under the name of *Endive*, is *C. endivium*. The *Common Goat's-beard*, *Tragopogon pratense*, grows in many parts of Britain, and is also known by the name of *Go-to-bed-at-noon*, from its flowers closing about that time. Withering states, that before the stems shoot up, the roots, boiled like asparagus, have the same flavour, and are nearly as nutritious; and we are informed by Villars that the children in Dauphiné universally eat the stems and leaves of the young plant, before the flowers appear, with great avidity; that the fresh juice of these tender herbs is the best solvent of the bile. *T. porrifolium* is cultivated in gardens, under the name of *Salsify*, for its roots; and another plant of the same esculent character, called *Scorzonera*, is *Scorzonera hispanica*. The roots of *S. deliciosa*, preserved with sugar, are extensively eaten by the natives of Parma, and the gummy roots of *S. tuberosa* are eaten by the Calmucs. The young roots of *Myoscolus hispanicus* are used as an esculent, and are said to possess diuretic properties. *Prenanthes serpentaria*, a native of Virginia and North Carolina, is called *Lion's Foot*, and is held in great reputation by the people of the countries where it grows as a remedy for bites of poisonous serpents. The milky juice is taken internally, and the leaves, steeped in water, are applied to the wound. The root of *Nabalus suavis* abounds in a very bitter, glutinous, milky juice, which is highly valued in similar cases. From the great bitterness of its root, *Mulgedium floridanum* is called *Gall of the Earth* by the Americans.

All the varieties of *Garden Lettuce* have originated from *Lactuca sativa*, a plant which has never yet been found in a wild state; and hence it may be concluded that it is merely another form of some species altered by cultivation. In its young state, the Lettuce forms a well-known and wholesome salad, containing a bland, pellucid juice, with little taste or smell, and exercising a cooling and soothing effect on the system,—not, as is generally believed, from the presence of any supposed narcotic principle, but from the great quantity of water and mucilage it contains. During the period of flowering, it abounds in a peculiar milky juice, which flows from the stem when wounded, and has been found to possess decided medicinal properties. The same juice is also found in the *Wild Lettuce* (*L. virosa*), a plant

found wild in many parts of Britain. The plant is very milky, with a strong, disagreeable odour, like that of opium, and a bitter, acrid taste. On analysis, it yields a bitter principle and a peculiar acid, resin, caoutchouc, wax, gum, albumen, and alkaline salts. From both species a substance called *Lactucarium* is obtained, by cutting off the tops of the plant when in bloom, collecting the exuding juice, and then inspissating it by a moderate heat. That which is yielded by the wild species is more abundant, and of a superior quality to that obtained from the Garden Lettuce. M. Schutz procured fifty-six grains from the former, and only seventeen grains from the latter. *Lactucarium* is a reddish-brown substance, with a narcotic odour and bitter taste, having a considerable resemblance to opium. It is composed of—1, a bitter, crystallisable substance called *lactucin*, *lactucerin*, or *lactueone*, soluble in alcohol and boiling water, scarcely soluble in cold water, insoluble in ether without alkaline reaction, and supposed to be the active principle; 2, mannite; 3, asparamide; 4, a crystallisable substance, having the property of colouring the sesquisalts of iron green; 5, an electro-negative resin, combined with potassa; 6, a neuter resin; 7, ulmate of potassa; 8, cerin, myricin, pectin, and albumen; 9, oxalate, malate, nitrate and sulphate of potassa, chloride of potassium, phosphato of lime and magnesia, oxides of iron and manganese, and silica. *Lactucerin* is in the form of snow-white, aggregated granules; it dissolves in strong, hot alcohol, which deposits it on cooling; is readily soluble in ether, but insoluble in water; becomes transparent and tenacious when moderately heated in a platinum dish; melts completely at a higher heat, with the escape of white, odorous vapours; is incapable of saponification by caustic potassa; and is therefore not properly a fat, and in alcoholic solution faintly reddens litmus paper. In its medical action, *Lactucarium* is narcotic, gently laxative, powerfully diuretic, and somewhat diaphoretic. Dr. Duncan, of Edinburgh, who first called special attention to this substance, recommended it as a substitute for opium, the anodyne properties of which it possesses, without being followed with the same injurious effects. In France a water is distilled from Lettuce, and used as a mild sedative, in the quantity of from two to four ounces, and the fresh leaves, boiled in water, are used as a cataplasm. *L. scariola*, or *Prickly Lettuce*, also found in Britain, possesses the same properties. *L. taraxacifolia*, a native of Guinea, is largely used by the negroes as a salad-plant, and its juice as an opiate.

Some plants of this family yield an acrid juice; thus *Zacyntha verrucosa*, which grows on the coast of the Mediterranean, is employed for its property of corroding or eating away ulcers; and *Crepis lacera*, a native of chalky soils on the Apennines and in the kingdom of Naples, is believed to be poisonous.

Tarchonanthus camphoratus, a small tree six or eight feet high, is a native of the Cape of Good Hope, where it is called *Sirichout*, and yields a close, heavy wood, which takes a fine polish, and is very beautiful.

ORDER CVIII.—GOODENIACEÆ.—GOODENIA FAMILY.

HERBACEOUS or shrubby plants, usually clothed with simple, and sometimes glandular down. *Leaves* alternate, simple, and without leaflets at their base. *Flowers* hermaphrodite, irregular. *Calyx* superior, or half-superior, rarely inferior, sometimes five-cleft, and sometimes three or five-parted. *Corolla* with the tube split, or with five unequal divisions inserted at the base or in the summit of the tube of the calyx. *Stamens* five, distinct, or very slightly united, alternating with the segments of the corolla. *Ovary* free or adherent, one-celled, or more or less completely two or four-celled. *Style* simple, or sometimes three-cleft. *Stigma* variable, fleshy. *Fruit* either drupaceous or capsular, many-seeded. *Seeds* sometimes nut-like, but usually with a thick covering. *Albumen* fleshy, conforming to the seeds, rarely wanting. *Embryo* erect, almost the length of the albumen, with medium-sized, usually leafy, seedlobes, and an inconspicuous plumule.

TRIBE 1. *Scævola*æ.—Fruit drupaceous or nut-like. Seeds definite.

GENERA AND SYNONYMS.

<i>Scævola</i> , L.	<i>Pogonantha</i> , G. Don.
<i>Lobelia</i> , Pl.	<i>Pogonetes</i> , Lindl.
<i>Cerbera</i> , Lour.	<i>Diaspasis</i> , R. Br.
<i>Glypha</i> , Lour.	<i>Dampiera</i> , R. Br.

TRIBE 2. *Goodenia*æ.—Fruit capsular, seeds indefinite.

GENERA AND SYNONYME.

<i>Selliera</i> , Cav.	<i>Calozyne</i> , R. Br.	<i>Velleja</i> , Sm.	<i>Latomia</i> , Endl.
<i>Goodenia</i> , Sm.	<i>Distylis</i> , Goud.	<i>Monoceras</i> , R. Br.	<i>Anthotium</i> , R. Br.
<i>Collema</i> , Anders.	<i>Euthales</i> , R. Br.	<i>Leschenaultia</i> , [R. Br.]	<i>Linsehotenia</i> , De V.

TRIBE 3. *Brunonia*æ.—Ovary superior. Stamens inserted in the receptacle. Embryo without albumen.

GENUS.

Brunonia, Smith.

GEOGRAPHICAL DISTRIBUTION.—All natives of Australia, where they are found in great abundance; but species of *Scævola* are also found in the Mascarenes and on the continent of India, as well as in the southern part of Africa; some are found in South America.

PROPERTIES AND USES.—The leaves and berries of *Scævola toccada*, a native of the East Indies, are very bitter, but the young leaves are used as a salad. Tonic properties are attributed to the bark and the wood in Amboyna, and the pith is administered against virile impotency and diarrhœa. The pith furnishes a sort of rice paper, which the Malays convert into artificial flowers and other painted ornaments. With the leaves of *S. Belamodogam*, cataplasms are made in Malabar, and a decoction of them acts as a diuretic and emmenagogue.



ORDER CIX.—STYLIDIACEÆ.—STYLEWORTS.

HERBS, sometimes under-shrubs. *Leaves* simple, entire, alternate, or rarely in whorls or radical. *Flowers* hermaphrodite, irregular. *Calyx* united with the ovary, contracted at the summit into a neck, and terminated by a persistent limb, which is often two-lipped, with five divisions. *Corolla* with five unequal lobes, inserted in the summit of the calyx. *Stamens* two, inserted on a disk which crowns the ovary, and united longitudinally with the style, which is terminated by an obtuse stigma. *Ovary* adherent, two-celled, but sometimes almost one-celled, from the partition being short. *Fruit*, a capsule, with one or two many-seeded cells. *Albumen* fleshy, somewhat oily, with a minute embryo in the base of the albumen near the hilum.

GENERA AND SYNONYMES.

<i>Stylidium</i> , Sw.	<i>Levenhookia</i> , R.Br.
<i>Ventenatia</i> , Sm.	<i>Gynocampus</i> ,
<i>Candollea</i> , Lab.	[<i>Lesch.</i>
<i>Andersonia</i> , Kön.	<i>Forstera</i> , L. f.
<i>Coleostylis</i> , Sonder.	<i>Phyllaehne</i> Forst
<i>Forsteropsis</i> , Sondr.	<i>Stibas</i> , Commers.

GEOGRAPHICAL DISTRIBUTION. — These are all found south of the equator, the greater part being natives of New Holland, beyond the tropics. One is found in Ceylon, one in Malabar, and one in Silhet. One species of *Forstera* grows in the southern mountains of New Zealand, and another in the marshy regions of Magellan.

No properties or uses have hitherto been assigned to them.



Fig. 136. *Stylidium*
laeronifolium.

ORDER CX.—CAMPANULACEÆ.—BELL-FLOWERS.

ANNUALS or perennials, herbs, rarely shrubs.

Leaves alternate, or sometimes opposite, simple, without leaflets at their base, sometimes containing a milky juice. *Flowers* hermaphrodite, regular. *Calyx* adhering to the ovary, persistent, generally with five divisions, rarely with three or eight, sometimes furnished with reflexed appendages, which alternate with the other lobes. *Corolla* inserted in the summit of the tube of the calyx, usually five-lobed, rarely three to eight-lobed. *Stamens* five, free, inserted with the corolla in the summit of the tube of the calyx; filaments usually expanded at the base, and bending towards the base of the style above the disk. *Anthers* fixed by the base, free, rarely more or less combined into a tube, two-celled. *Ovary* inferior, with two or three, rarely five, many-ovuled cells. *Style* filiform, hairy, with two or three, rarely five stigmas. *Fruit*, a capsule, opening either laterally or at the summit, by as many fissures as there are cells. *Seeds* numerous, attached to a central seed-bearer. *Embryo* in the centre of fleshy albumen, with very short, obtuse seed-lobes, and the radicle next the hilum.



Fig. 137. *Campanula Vidalii*. A. Section of the flower of *Campanula medium*.

TRIBE 1. *Wahlenbergiæ*.—Capsule opening at the summit.

SUB-TRIBE 1. JASIONIDÆ. *Corolla five-parted; anthers combined.*

GENUS AND SYNONYMES.

Jasione, *L.*
 Aphyllanthes, *Dalech.*
 Ovilla, *Ad.*

SUB-TRIBE 2. LIGHTFOOTIDÆ. *Corolla five-parted; anthers distinct.*

GENERA AND SYNONYMES.

Lightfootia, <i>Herit.</i>	Megasanthes,	Cælotheca, <i>A. DC.</i>	Campanopsis,
Cephalostigma,	[<i>G. Don.</i>	Wahlenbergia,	[<i>R. Br.</i>
[<i>A. DC.</i>	Canarina, <i>Juss.</i>	[<i>Schrad.</i>	Nesophila, <i>A. DC.</i>
Campanumæ, <i>Bl.</i>	Canaria, <i>L.</i>	Codonia, <i>Sp.</i>	Cervicina, <i>A. DC.</i>
Codonopsis, <i>Wall.</i>	Pernettya, <i>Scop.</i>	Aikinia, <i>Salis.</i>	Heterochaenia,
Glossocomia,	Platyodon, <i>A. DC.</i>	Schultesia, <i>Roth.</i>	[<i>A. DC.</i>
[<i>D. Don.</i>	Microcodon, <i>A. DC.</i>		

SUB-TRIBE 3. PRISMATOCARPIDÆ.—*Corolla three or six-cleft, or three or six-lobed at the apex. Anthers always distinct.*

GENERA AND SYNONYME.

Prismatocarpus, <i>A. DC.</i>	Aculeosa, <i>Fluken.</i>
Röella, <i>L.</i>	Edraianthus, <i>A. DC.</i>

TRIBE 2. Campanulæ.—*Capsules opening at the sides or at the base.*

GENERA AND SYNONYMES.

Phyteuma, <i>L.</i>	Mindium, <i>Ad.</i>	Legouzia <i>Durand</i>	Melanocalyx,
Rapunculus, <i>T.</i>	Campanula, <i>L.</i>	Apenula, <i>Neck.</i>	[<i>Endl.</i>
Rapuntium, <i>Lob.</i>	Marianthemum,	Dysmicodon,	Anotocalyx,
Physoplexis <i>Endl.</i>	[<i>Schrank.</i>	[<i>Endl.</i>	[<i>A. DC.</i>
Hedranthum,	Rapuntium, <i>Chev.</i>	Triodallus, <i>Raf.</i>	Sericodon, <i>Endl.</i>
[<i>G. Don.</i>	Eacodon, <i>A. DC.</i>	Trachelium, <i>L.</i>	Otocalyx, <i>A. DC.</i>
Podanthum,	Roncecla, <i>Dumort.</i>	Adenophora, <i>Fisch.</i>	Musschia, <i>Dum.</i>
[<i>G. Don.</i>	Erinia, <i>Noul.</i>	Flörkea, <i>Sp.</i>	Rhigiophyllum,
Petromarula,	Specularia, <i>Heist.</i>	Cyphocarpus, <i>Miers</i>	[<i>Hochst.</i>
[<i>A. DC.</i>	Prismatocarpus,	Symphyandra,	Cyphia, <i>L.</i>
Miehauxia, <i>Herit.</i>	[<i>Herit.</i>	[<i>A. DC.</i>	Cyphium, <i>Gmel</i>

ANOMALOUS GENERA AND SYNONYMES.

Merciera, <i>A. DC.</i>	Sphenoclea, <i>Gärt.</i>	„ Gartnera, <i>Retz.</i>
Pentaphragma, <i>Wall.</i>	Pongatium, <i>Juss.</i>	Rapinia, <i>Lour.</i>

GEOGRAPHICAL DISTRIBUTION.—They are mostly found in the temperate regions of the Old World, and become very rare towards the equator. They are rather plentiful at the Cape of Good Hope and also in Australia, and they are also met with in the antarctic islands.

PROPERTIES AND USES.—A great number of the plants of this family contain a milky juice, which is sometimes remarkably bitter and acrid; but it is generally concealed by the presence of a great quantity of mucilage,

particularly when the plants are young and abound in watery principles. An infusion of *Wahlenbergia linarioides* is used in Chili as a cure for griping of the bowels; and *W. graminifolia* has been recommended by some as a remedy in epilepsy. The young and tender roots of *Phyteuma spicata*, *Adenophora communis*, *Campanula rapunculoides*, and *C. rapunculus*, are eatable. The last is that which is grown in gardens under the name of *Rampion*. The root is thick, milky, and is mixed in salads. *C. trachelium*, a native of Britain, is called *Great Throat-wort*, from the decoction of the herb, which is bitter and somewhat acrid, being used as a gargle. The Japanese regard *C. glauca* as a tonic little inferior to Ginseng. The Hottentots eat the tuberous roots of *Cyphia digitata*.

Almost the whole of this family are more or less ornamental, either as garden or wild flowers. The beautiful *Canterbury Bells* are *C. medium*. What is now very often called *Chimney Plant* is the stately *C. pyramidalis*. The lovely little *Scotch Blue Bell* is *C. rotundifolia*, so plentiful on hedge-banks and mountain pastures. *Venus' Looking-glass* is *Specularia speculum*, and there are very few of them which do not in some degree contribute to beautify our garden flower-borders



ORDER CXI.—LOBELIACEÆ.—LOBELIA FAMILY.

HERBS or undershrubs, rarely trees. *Leaves* alternate, simple, without

leaflets at their base, the radical ones very close together. *Flowers* hermaphrodite, generally irregular. *Calyx* completely united to the ovary, or only at the base, with five irregular divisions. *Corolla* with five lobes, having the tube split throughout its whole length on the upper side, or with five petals unequally united together. *Stamens* five, inserted with the corolla at the summit of the tube of the calyx, united, as well as the anthers, into a long tube sheathing the style, and often terminated by a bundle of hairs. *Ovary* inferior, with one, two, or three many-ovuled cells. *Style* thread-like. *Stigmas* two, rarely three, surrounded with a cup-like fringe. *Fruit* with one, two, or three many-seeded cells, either unopening, fleshy or dry, or a capsule opening at the top. *Seeds* attached either to a central or marginal seed-bearer. *Embryo* straight, in the axis of fleshy albumen, with the radicle pointing to the hilum, and with obtuse seed-lobes.



Fig. 133. *Siphocampylus microstoma*. A, Flower of *Lobelia cardinalis*.

TRIBE 1. *Clintoniæ*.—Ovary one-celled, with a seed-bearer spread out through the incomplete partition, or with two marginal seed-bearers. Capsule one-celled, opening by an aperture at the apex or by three small valves, of which two bear the seeds in the middle.

GENERA.

Grammatotheca, Presl.
Clintonia, Dougl.

| *Lysipoma*, H. B. K.
Hypsela, Presl

TRIBE 2. *Lobeliææ*.—Ovary two or three-celled; seed-bearer longitudinally adnate to the partition. Capsule two or three-celled, opening by the backs of two or three valves.

GENERA AND SYNONYMES.

Metzlera, <i>Presl.</i>	Sclerotheca, <i>A. DC.</i>	Tupa, <i>G. Don.</i>	Enchysia, <i>Presl.</i>
Parastranthus, <i>G.</i>	Trimeris, <i>Presl.</i>	Tylomium, <i>Presl.</i>	Isotoma, <i>R. Br.</i>
[<i>Don.</i>	Lobelia, <i>L.</i>	Rhynchoptalum	Solenanthis, <i>Kth.</i>
Xanthomeria,	Rapuntium, <i>T.</i>	[<i>Hochst.</i>	Hippobroma, <i>G.</i>
[<i>Presl.</i>	Stenotium, <i>Presl.</i>	Siphocampylus <i>Pohl</i>	[<i>Don.</i>
Dombrowskia <i>Presl.</i>	Dorsmannia, <i>Rudb.</i>	Lobelia, <i>Presl.</i>	Byrsanthes, <i>Presl.</i>
Monopsis, <i>Salis.</i>	Sphaerangium,	Canonanthus <i>Don</i>	Heterotoma, <i>Zucc.</i>
Specularia, <i>Sol.</i>	[<i>Presl.</i>	Laurentia, <i>Neck.</i>	Myopsia, <i>Presl.</i>
Holostigma, <i>Don.</i>	Homochilus, <i>A.</i>	Solenopsis, <i>Presl.</i>	Streleskia, <i>Hook. f.</i>
Isolobus, <i>A. DC.</i>	[<i>DC.</i>		

TRIBE 3. *Delisseacææ*.—Ovary two-celled. Seed-bearer adnate on both sides with the partition. Fruit two-celled, unopening, dry or fleshy.

GENERA AND SYNONYMES.

Pratia, <i>Gaud.</i>	Delissea, <i>Gaud.</i>	Rollandia, <i>Gaud.</i>
Piddingtonia, <i>A. DC.</i>	Kittelia, <i>Reichb.</i>	Clermontia, <i>Gaud.</i>
Bernonia, <i>Endl.</i>	Cyanea, <i>Gaud.</i>	Centropogon, <i>Presl.</i>
Colusea, <i>Hook. f.</i>	Microchilus, <i>Presl.</i>	Rhynchoptalum, <i>Fresen</i>

GEOGRAPHICAL DISTRIBUTION.—In the New World they are frequently found between the tropics; and in Africa and Asia they are found southward of these regions. Many inhabit North America, but they are more rare in the northern parts of Europe and Asia; one is found in Kamtschatka.

PROPERTIES AND USES.—These are charged with a milky juice, which is powerfully acrid and narcotic, corrodes the skin, inflames the mouth and intestines, causes vomiting and purging, and is fatal both to man and beast. *Tupa Fueillei*, formerly called *Lobelia tupa*, is very poisonous; even the smell of the flowers will cause vomiting; and if the milk of it touches the eyes, it causes blindness. It is a native of Chili and Peru. *T. Berteri* and *T. salicifolia* have the same poisonous properties. From *Siphocampylus caoutchouc*, a native of the province of Popayan, in South America, a milky juice exudes, which, on concretion, becomes an elastic gum, and is called by the inhabitants *caoutchouc*; but this is a very different article from the *caoutchouc* of commerce. The root of *Lobelia syphilitica* was greatly esteemed by the North American Indians as a cure for syphilis, and for a long period they kept its virtues a profound secret; afterwards, however, when the secret was purchased from them, it was, on trial, found to be quite inefficacious in that complaint. It is emetic, cathartic, and diuretic in its action, and has been found useful in cases of dropsy. *L. inflata* is also a native of the United States, and the whole plant, which is called *Indian Tobacco*, is possessed of medicinal virtues, and particularly the roots and the inflated seed-vessels. When dried, the plant is formed into oblong compressed cakes, and has a slightly irritating odour and a burning acrid taste somewhat like that of tobacco, causing a flow of saliva and a feeling of nausea. *Lobelia* contains an odorous volatile oil; a peculiar alkaline principle called *lobelina*; a peculiar acid named *lobelic acid*; and gum,

Fesin, chlorophylle, fixed oil, lignin, salts of lime and potassa, and oxide of iron. The seeds contain twice as much lobelia in proportion as the whole plant, and yield a fixed oil which possesses remarkable drying properties. Lobelia is an acrid, narcotic, and violent emetic, occasionally cathartic, and in small doses, diaphoretic and expectorant. The leaves or seed-vessels chewed for a short time occasion giddiness, headache, tremors, nausea, and vomiting. The drug has proved highly useful in spasmodic asthma, catarrh, croup, and chest affections. The root of *L. cardinalis* is anthelmintic, and that of *L. urens* excites a burning sensation in the tongue; the whole plant, abounding in a milky juice, causes the same effect. *Isotoma longiflora* is a dangerous poison. It is a native of the West Indies, and is called by the Spanish Americans *Rebenta caballos*, because it kills horses who eat it, by swelling them up till they burst. Taken internally, it proves a cathartic so violent, that no remedy can check its operation, and death is the result.



ORDER CXII.—SYMPLOCACEÆ—SYMPLOCOS FAMILY.

TREES or shrubs. *Leaves* simple, alternate, entire, and without leaflets

at the base. *Flowers* hermaphrodite, regular. *Calyx* united to the ovary, with four or five free segments. *Corolla* inserted on the calyx, deeply five-lobed, rarely of three to ten lobes, with an imbricate æstivation. *Stamens* numerous, inserted at the base of the corolla, arranged in several series, and united at the base. *Ovary* inferior, with two, three, or five cells, surmounted by a large cushion-like, fleshy gland. *Style* simple, terminated by a notched stigma. *Fruit* a drupe, fleshy, with three to five cells. *Seeds* horny. *Embryo* inverted, and placed in the axis of a fleshy albumen, which is sometimes wanting.



Fig. 139. *Symplocos japonica*. A, B, Sections of the ovary of *S. laxiflora*.

SUB-CLASS I.—SYMPLOCACEÆ.

Albumen fleshy.

GENERA AND SYNONYMES.

<i>Symplocos</i> , Jacq.	<i>Stemmatosiphon</i> ,	<i>Bobua</i> , Ad.	<i>Epigenia</i> , Vell.
<i>Alstonia</i> , L.	[<i>Pohl</i> .	<i>Palura</i> , Ham.	<i>Scyrtocarpus</i> , Miers
<i>Ciponima</i> , Aubl.	<i>Hopca</i> , L.	<i>Barberina</i> , Vell.	<i>Symplocura</i> , Miers.

SUB-CLASS II.—NAPOLEONEÆ.—Albumen wanting.

GENERA AND SYNONYME.

<i>Napoleona</i> , Palis.	<i>Asteranthos</i> , Desf.
<i>Belvisia</i> , Desv.	

GEOGRAPHICAL DISTRIBUTION.—Natives of the tropics of South America and Africa, and in the warmer parts of Asia north of the tropics.

PROPERTIES AND USES.—The leaves of *Symplocos Alstonia*, a native of New Granada, are used as tea. The nuts of *S. spicata*, when bored, are strung like beads, by the natives of Silhet, and hung round the necks of the children to prevent evil. The bark of *S. racemosa* is used in India as a mordant, to dye red, with a species of Rubia called Mungeet. A decoction of the leaves of *Hopea tinctoria* dyes linen and silk of a bright yellow. The plant is a native of Carolina, and is there called *Sweet-leaf*. The root is bitter and aromatic. The fruit of *Napoleona imperialis* is as large as a pomegranate, and contains an eatable mucilaginous pulp, and the rind contains so much tannin that the natives of Africa make ink of it.



Fig. 141. A, Flower of *Napoleona imperialis*. B, a stamen. C, section of the ovary.

ORDER CXIII.—COLUMELLIACEÆ.

THIS small order is nearly allied to Symplocaceæ, but differs from it in the number of its stamens, which are only two, and these are inserted in the throat of the corolla. The fruit is a capsule, two-celled and many-seeded.

GENUS.

Columellia, Ruiz. & Pav.

All the species are natives of Peru and Mexico.

ORDER CXIV.—VACCINIACEÆ.—CRANBERRIES.

SMALL trees and shrubs, with numerous round or irregular angular



branches. *Leaves* simple, entire, dentate, or frequently erenate, with very short foot-stalks, sometimes with glandular dots. *Flowers* hermaphrodite, regular. *Calyx*, Fig. A, adherent to the ovary, with a superior, four, five, or six-parted limb, which is either deciduous or persistent. *Corolla*, Fig. B, epigynous, with four, five, or six lobes, which are alternated with the lobes of the calyx, and imbricate in aestivation. *Stamens* double the number of the lobes of the corolla, epigynous, in one series; filaments either free or in bundles. *Ovary* infe-

rior, four, five, six, or ten-celled, with the seed-bearers attached to the central column; style simple; stigma simple. *Fruit*

a berry or a drupe, Fig. C, crowned by the persistent limb of the calyx. *Seeds* minute, pendulous when solitary. *Embryo* straight, in the axis of fleshy albumen; seed-lobes very short, with a long, superior radicle.

Fig 140. *Thibaudia macrantha*.
A, calyx of *Vaccinium myrtillus*,
B, flower; C, fruit; D, section of
fruit.

GENERA AND SYNONYMES.

Adenaria, Raf.
Gonocalyx, Pl. & L.
Thibaudia, Pav.
Agapetes, Don.
Decachæna, T. & G.

„ *Cavinium*, Thou.
? *Acosta*, Lour.
Tauschia, Presl.
Andrewsia Dunal
Peyrusa, Rich.

Gaylussacia, H. B. K
Lussacia, Sp.
Sphyrsperrum,
[Pöpp. & Endl.
Hornemannia,
[Vahl.
Ceratostema, Juss.
Oreanthes, Benth.
Cavendishia, Lindl.

Oxycoccos, T.
Schollera, Roth.
Vaccinium, L.
Vitis idæa, T.
Macleania, Hook.
Anthopteris, Hook.
? *Brossæa*, Plum.
? *Amecchania*, DC.

GEOGRAPHICAL DISTRIBUTION.—They generally inhabit marshy places in mountainous regions, in the temperate parts both of the Old and the New World. They are generally confined to the northern hemisphere; but a few, with parasitical habits, are found in Peru.

PROPERTIES AND USES.—The leaves and bark contain a bitter extractive substance, with somewhat tonic properties. The berries are subacid, moderately astringent, and agreeably flavoured, and contain mucilage, sugar, malic and citric acid, and an astringent substance, which exercises a tonic effect. The *Common Bilberry* or *Blueberry* (*Vaccinium myrtillus*) grows abundantly on the moors of England and Scotland, and produces berries of the size of currants, of a bluish-black colour, covered with a mealy bloom. They are eaten either raw or in tarts with cream, or made into jellies with sugar. In Devonshire they are eaten with clotted cream. With the juice of the berries mixed with the bark of alder, powdered and mixed with alum, the inhabitants of northern Russia dye their hair of a bright red colour. The fruit of the *Great Whortleberry* (*V. uliginosum*) is large and black, but less juicy than the preceding, and neither so agreeable nor so wholesome, on account of its narcotic properties, which, when the fruit is eaten to any extent, cause headaches and vertigo; they are sometimes put into beer, to make it heady, and, when fermented, they make an intoxicating liquor. The *Cowberry*, or *Red Whortleberry* (*V. vitis idæa*) is abundant on the dry, barren moors of Scotland. The berries are dark red, acid, and austere, and not so agreeable as either the cranberry or the bilberry. They make an excellent jelly, which is esteemed for colds and sore throats, or to eat with roasted meat, for which latter purpose the Swedes use it extensively to venison, and consider it superior to currant jelly. In Wales it is eaten to roast mutton. The *Common Cranberry* (*Oxycoccus palustris*) grows in mountainous districts in the northern regions both of the Old and New World, and is also found in many parts of Britain. The berries are pear-shaped, globular, often spotted, crimson, of a peculiar flavour, with a strong acidity. They are much esteemed in tarts. The *American Cranberry* (*O. macrocarpus*) produces fruit much larger than the preceding, and of a brighter red colour. The plant grows wild in many parts of America, but is also cultivated for its fruit. The flowers of *Thibaudia melliflora* are charged with a honeyed juice; and with the juice of the berries of *T. macrophylla* the people of Pasta make wine. With the flowers of *T. quercina* the Peruvians make a tincture which is good against the toothache. Its flowers, bracts, and wood, are very sweet-scented, and yield the scent to water or alcohol.



CLASS III.—COROLLIFLORÆ.

FLOWERS provided with two floral envelopes (dichlamydeous), that is, having both a calyx and a corolla. The corolla consists of one petal only, which is not inserted on the calyx, but in the receptacle (hypogynous). The stamens are always inserted in the corolla, except in the first group, *Hypostamineæ*, in which they are inserted in the receptacle. The ovary is always free, and therefore superior.



Group 1. HYPOSTAMINEÆ.—Stamens inserted in the receptacle.

Order 115. ERICACEÆ.

116. PYROLACEÆ.

117. MONOTROPACEÆ.

118. EPACRIDACEÆ.

Group 2. EPICOROLLEÆ.—Stamens inserted on the corolla.

Order 119. AQUIFOLIACEÆ.

120. OLEACEÆ.

121. EBENACEÆ.

122. STYRACACEÆ.

123. SAPOTACEÆ.

124. MYRSINACEÆ.

125. SALVADORACEÆ.

126. JASMINACEÆ.

127. ASCLEPIACEÆ.

128. APOCYNACEÆ.

129. LOGANIACEÆ.

130. GENTIANACEÆ.

131. BIGNONIACEÆ.

132. CRESCENTIACEÆ.

133. PEDALIACEÆ.

134. GESNERACEÆ.

135. POLEMONIACEÆ.

Order 136. HYDROPHYLLACEÆ.

137. DIAPENSIACEÆ.

138. CONVULVULACEÆ.

139. CORDIACEÆ.

140. BORAGINACEÆ.

141. EHRETIACEÆ.

142. NOLANACEÆ.

143. SOLANACEÆ.

144. OROBANCHACEÆ.

145. SCROPHULARIACEÆ.

146. LABIATÆ.

147. VERBENACEÆ.

148. SELAGINACEÆ.

149. ACANTHACEÆ.

150. LENTIBULARIACEÆ.

151. PRIMULACEÆ.

152. PLUMBAGINACEÆ.

153. PLANTAGINACEÆ.

ORDER CXV. ERICACEÆ.—HEATH-BLOOMS.

SMALL trees or shrubs. *Leaves* opposite or in whorls, entire, and without leaflets at their base. *Flowers* hermaphrodite, regular, but sometimes slightly irregular. *Calyx* with four or five divisions, free. *Corolla* hypogynous, with four or five lobes, regular or irregular, in æstivation, imbricate. *Stamens* eight or ten, not united with the corolla, but inserted in the receptacle. *Anthers* two-celled, furnished at the base with an appendage, and opening at the summit by a pore. *Ovary* superior, surrounded at the base with a lobed disk, having many-ovuled cells. *Style* straight, simple. *Stigma* simple, erenate, or three-cleft. *Fruit* a capsule, many-celled, with central seed-bearers, opening either loculicidally or septicidally. *Seeds* numerous, minute. *Embryo* cylindrical in the centre of fleshy albumen, with the radicle next the hilum, and longer than the seed-lobes.



Fig. 142.—A, *Rhododendron kamtschaticum*. B, *Cassiope fastigata*.

SUB-ORDER I.—ERICAÆ.

Fruit, a capsule, with a loculicidal dehiscence, very rarely septicidal; rarely a berry. Buds without scales.

TRIBE 1. *Arbuteæ*.—Fruit a berry, unopening. Corolla deciduous.

GENERA AND SYNONYMES.

Arbutus, T.
Uncdo, Link.

Enkyanthus, Lour.
Melidora, Salis.

Arctostaphylos, Ad.
Uva Ursi, T.

Macrania, Neck.
Comarostaphylis,
[Zucc.

Pernettya, <i>Gaud.</i>	„ Chiogenes, <i>Salis.</i>	„ Phalerocarpus, [Don.]	„ Diplicisia, <i>Bl.</i>
Gaultheria, <i>L.</i>	Glycyphylla, <i>Raf.</i>	Amphycalyx, <i>Bl.</i>	Shallonium, <i>Raf.</i>
Gauteria, <i>Kalm.</i>			

TRIBE 2. *Andromedæ*.—Fruit a capsule, with a loculicidal dehiscence, very rarely septicidal. Corolla deciduous.

GENERA AND SYNONYMES.

Epigæa, <i>L.</i>	Lyonia, <i>Nutt.</i>	Baumannia, <i>DC.</i>	Agarista, <i>Don.</i>
Menceylon, [Mitch.]	Xolisma, <i>Raf.</i>	Chomædaphne, [B&B.]	Menziesia, <i>Sm.</i>
Clethra, <i>L.</i>	Oxydendrum, <i>DC.</i>	Zenobia, <i>Don.</i>	Bryanthus, <i>Gmel.</i>
Cuellarea, <i>R. & P.</i>	Andromeda, <i>L.</i>	Leucothœe, <i>Don.</i>	Phyllodoce, <i>Sal.</i>
Tinus, <i>L.</i>	Cassiope, <i>Don.</i>	Cassiphone, <i>Rehb.</i>	Daböccia, <i>Don.</i>
Volkameria, [R. Br.]	Polifolia, <i>Buxb.</i>	Maria, <i>DC.</i>	Boretta, <i>Neck.</i>
Junia, <i>Ad.</i>	Cassandra, <i>Don.</i>	Agauria, <i>DC.</i>	Arcimbalda, <i>Endl.</i>
	Lyonia, <i>Rehb.</i>	Pieris, <i>Don.</i>	Candollea, <i>Baum.</i>
	Diplaria, <i>Raf.</i>		

TRIBE 3. *Ericidæ*.—Fruit a capsule, with a loculicidal dehiscence, very rarely septicidal, sometimes somewhat indehiscant, as in *Salaxis*. Corolla permanent.

SUB-TRIBE 1. *ERICINÆ*.—Ovary four, rarely five or eight-celled; cells many-ovuled.

GENERA AND SYNONYMES.

Maenabia, <i>DC.</i>	„ Desmia, <i>Don.</i>	Chona, <i>Don.</i>	Philippia, <i>Klotz.</i>
Calluna, <i>Salis.</i>	Eurylepis, <i>Don.</i>	Syringodea, <i>Don.</i>	Eleutherostemon, [Klotzch.]
Pentapera, <i>Klotz.</i>	Eurystegia, <i>Don.</i>	Dasyanthos, <i>Don.</i>	Ericinella, <i>Kl.</i>
Erica, <i>L.</i>	Lophandra, <i>Don.</i>	Ectasis, <i>Don.</i>	Blæria, <i>L.</i>
Gypsocallis, <i>Don.</i>	Lamprotis, <i>Don.</i>	Eriodesmia, <i>Don.</i>	Microtrema, <i>Kl.</i>
Pachysa, <i>Don.</i>	Callista, <i>Don.</i>	Oetopera, <i>Don.</i>	
Ceramia, <i>Don.</i>	Euryloma, <i>Don.</i>	Bruckenthalia, <i>Rehb.</i>	

SUB-TRIBE 2. *SALAXIDÆ*.—Ovary one to four-celled; cells one-ovuled

GENERA AND SYNONYMES.

Eremia, <i>Don.</i>	Simocheilus, <i>Benth.</i>	Syndesmanthus, <i>Kl.</i>	Scyphogyne, <i>Brongn.</i>
Poderemia, <i>Benth.</i>	Plagiostemon, <i>Kl.</i>	Macrolinum, <i>Kl.</i>	Tristemon, <i>Kl.</i>
Micreremia, <i>Bth.</i>	Thamnus, <i>Kl.</i>	Codonanthemum, <i>Kl.</i>	Omphalocaryon, [Kl.]
Hexastemon, <i>Kl.</i>	Thoracosperma, <i>Kl.</i>	Anomatanthus, <i>Kl.</i>	Lagenocarpus, <i>Kl.</i>
Finckea, <i>Kl.</i>	Oetozonia, <i>Kl.</i>	Coilostigma, <i>Benth.</i>	Salaxis, <i>Salis.</i>
Grisebachia, <i>Kl.</i>	Pachycalyx, <i>Kl.</i>	Thamnum, <i>Kl.</i>	Coccosperma, <i>Kl.</i>
Aerostemon, <i>Kl.</i>	Sympiezia, <i>Licht.</i>	Codonostigma, <i>Kl.</i>	
Comacephalus, <i>Kl.</i>			

SUB-ORDER II.—RHODODENDREÆ.

Fruit capsular with a septicidal dehiscence. Buds scaly, cone-shaped.

TRIBE 1. *Rhododendridæ*.—Petals more or less concrete.

GENERA AND SYNONYMES.

Azalea, <i>L.</i>	Loiseleuria, <i>Desv.</i>	Rhodora, <i>L.</i>	Rhodothamnus, [Rehb.]
Anthodendron, [Rehb.]	Chamaecistus, [Gray.]	Rhododendron, <i>L.</i>	Adodendron, <i>Neck.</i>
Theis, <i>Salis.</i>	Chameledon, [Link.]	Osmothamnus, <i>DC.</i>	Chamaecistus, <i>Don.</i>
		Kalmia, <i>L.</i>	Ledum, <i>Mitch.</i>

TRIBE 2. *Ledidæ*.—Petals not concrete.

GENERA AND SYNONYMS.

Leiophyllum, <i>Pers.</i>	„ Ammysine,	Bejaria, <i>Mutis.</i>	Ledum, <i>L.</i>
Dendrium, <i>Desv.</i>	[<i>Pursh.</i>	Befaria, <i>Mutis.</i>	Dulia, <i>Ad.</i>
	Fischera, <i>Siv.</i>	Acunna, <i>R. & P.</i>	

GEOGRAPHICAL DISTRIBUTION.—They are distributed over the whole globe; not unfrequent in the cold regions of the northern hemisphere, rarer in the temperate regions, and rare between the tropics. At the Cape of Good Hope they are very abundant, but they are rare in Australia.

PROPERTIES AND USES.—The virtues are bitter, astringent, aromatic, and resinous; in some they are narcotic. The *Ericæ* abound in a bitter astringent substance, and some in a balsamic resin, and the fruit of some are eatable. The *Rhododendreæ* possess narcotic properties.

Ericæ.—The *Strawberry Tree* (*Arbutus unedo*), so frequently met with in shrubberies, is found wild about the lakes of Killarney, in Ireland, but is perhaps not really indigenous, otherwise it would not be confined so exclusively to that particular spot. The tree is a native of the whole of the south of Europe, and in all probability it was introduced from Spain to that part of Ireland at a very early period, when commercial intercourse was extensively carried on between Spain and the people of the south of Ireland. The fruit, when ripe, has a pleasant flavour, with an agreeable acid; but it is not regarded as an edible fruit, the plant being cultivated entirely for ornamental purposes. In Corsica, the inhabitants make a wine from the fruit, which, if taken in quantity, has a narcotic effect; and in Italy, a spirit is distilled from them. The bark and leaves are astringent. The fruit of *A. andrachne* is similar in appearance and in properties. The *Bear-berry* (*Arctostaphylos uva-ursi*) is a low, trailing shrub, found in all mountainous districts in the northern hemisphere, both of the old and new world. It produces small red berries, the size of a pea, which, when ripe, are mealy, with an austere taste, and are eaten by grouse. The leaves are used medicinally as an astringent and tonic, and are supposed to act more particularly on the urinary organs. They contain tannic and gallic acids, bitter extractive, resin, gum, fatty matter, a volatile oil, and salts of potassa and lime. So rich are they in tannic acid that, in Russia, they are used for tanning leather. They have been found to contain a peculiar crystallisable principle, called *ursin*, which is in the form of colourless, transparent, needle-shaped crystals, soluble in alcohol, ether, and diluted acids, insoluble in the fixed and volatile oils, neutral to test-paper, and combustible. One grain of this substance acts as a powerful diuretic. The leaves of *Bear-berry*, either in decoction or in powder, have a direct action on the kidneys and urinary passages, and have been found highly useful in gravel, ulceration of the kidneys, bladder, or urinary passages. They have also been very serviceable in catarrh of the bladder, incontinence of urine, gleet, leucorrhœa, and menorrhagia. The North American Indians mix the leaves with their tobacco, in the proportion of one-fourth of the former. The berries of *A. alpina*, also an inhabitant of mountainous regions, are about the size of a sloe, with a taste somewhat like that of black currants, but more mawkish, insomuch that Linnæus says the Laplanders will scarcely eat them; but

Haller thinks the flavour not unpleasant. *Gaultharia procumbens*, called in North America *Partridge-berry* and *Winter Green*, inhabits dry mountainous districts and sandy plains throughout the United States. The fruit is a bright scarlet berry, with a sweetish taste and peculiar flavour, which some consider agreeable; and it forms a favourite food of partridges, deer, and other wild animals, and hence it is also called *Deer-berry*. Steeped in brandy, it is drunk in small quantities as bitters. The whole plant has an agreeable aromatic odour and taste, and the leaves are possessed of an astringency due to the presence of tannic acid; and, when properly dried, they make an excellent substitute for tea, for which purpose they are used, and the plant is on that account called *Tea-berry* and *Mountain Tea*. The aromatic properties are due to the presence of a volatile oil, which may be separated by distillation. The leaves of this plant, used medicinally, act as other stimulant aromatics with which astringency is combined. They are employed with advantage in chronic diarrhoea, and also as an emmenagogue, with the view of increasing the secretion of milk. The oil is most generally used by regular practitioners, but instances of death having ensued are on record, from an unguarded use of it. It is known by the name of Oil of Winter Green.

Epigæa repens, called in America *Ground Laurel* and *May-flower*, is a small trailing plant, inhabiting woods and the northern sides of hills in the United States. It is said to be injurious to cattle who eat it. The leaves and stems are extensively used in some parts of the United States as a popular remedy in diseases of the urinary organs and the viscera of the pelvis, particularly where irritated action has taken place; and *Epigæa* has given relief where *uva-ursi* and *buchu* have failed. *Oxydendron arboreum* is a native of the Alleghany mountains, and is called *Sorrel Tree* from the agreeable acid flavour of its leaves. They are used by hunters to quench their thirst, and in decoction they form a grateful cooling drink in fevers. A decoction of *Andromeda mariana* is used in the southern states of America as a wash for a disagreeable ulceration of the feet, to which the negroes are subject. The powder which is secreted on the leaves and buds of *A. speciosa* is said to cause a free discharge of mucus when snuffed up the nose. *A. ovalifolia*, a native of Nepaul, is fatal to goats who eat of it; and *A. polifolia*, a native of the north of Europe, is an acrid narcotic, and is fatal to sheep. The *Common Heath*, or *Ling*, of the hills of Britain, is *Calluna vulgaris*. In the Highlands of Scotland, this plant serves a great variety of purposes. The poorer inhabitants make walls for their cottages with alternate layers of heath and a kind of mortar made of black earth and straw, the woody roots of the heath being placed in the centre, and the tops internally and externally. They make their beds of it by placing the roots downwards and laying the plants in a sloping direction; the tops only being uppermost, they make a soft and elastic couch. With Heath, cottages are thatched, besoms are made, and faggots are composed to burn in ovens. In the island of Islay, ale is frequently made by brewing one part of malt and two of the tops of young heath, with sometimes an addition of hops; and this liquor, according to Boethius, was much used by the Piets. Woollen cloth boiled in alum water, and afterwards in a strong decoction of heath tops, comes out of a fine orange colour; and the stalks and tops will tan leather. Sheep and goats will sometimes eat the tender shoots, but they are

not fond of them. Cows which feed upon it, without having access to plenty of water, give bloody milk. Horses will eat the tops; and from the flowers bees extract a great quantity of honey, which is of a deep colour. The young tops form almost exclusively the food of grouse. The Heaths which contribute so much to the beauty of our greenhouses are all natives of the Cape of Good Hope, and embrace upwards of six hundred species and varieties.

Rhododendreæ.—The whole of this sub-class are possessed of acrid narcotic properties. *Azalia pontica* is a beautiful shrub, but it is possessed of highly narcotic properties. Pallas is of opinion that it was the honey gathered from this plant which caused so much destruction in Xenophon's army in the retreat of the 10,000. He says that honey collected from this plant has the same effect on the system as *Lolium temulentum*. It grows abundantly in Asia Minor and in the neighbourhood of the Black Sea; and it is stated that goats which eat of the leaves suffer in consequence, and that to cattle and sheep they are fatal. *Rhododendron chrysanthum*, a small shrub about a foot high, and a native of Siberia, has stimulant, narcotic, and diaphoretic virtues, causing, when taken in large doses, vomiting, purging, and delirium. In Siberia it enjoys a reputation for efficacy in a great variety of diseases; but it is in rheumatism that its virtues are most apparent. It is the leaves that are used in infusion; and when this is taken it causes a creeping or pricking sensation in the part affected, which subsides in a few hours, leaving the part free from pain. It is also considered useful in syphilis and palsy. *R. ferrugineum*, a native of the Alps, has properties closely resembling the preceding, and an infusion of the leaves causes profuse perspiration, for which it is employed by the inhabitants of those alpine districts where it is indigenous. By infusing the buds a thick oil is obtained, which is used by the Piedmontese physicians, under the name of *Olio di marmotta*, against diseases of the joints and in healing wounds. *R. maximum* is said to possess the same properties. In the mountainous parts of India the natives eat the flowers of *R. arboreum*, and European residents form them into a jelly. The beautiful varieties of Rhododendrons which are now so numerous have all been derived from crossing *R. ponticum*, *R. catawbiense*, and *R. arboreum*. *Ledum palustre* is a native of the north of Europe and North America, and is called *Wild Rosemary*. Its leaves have a balsamic odour, an aromatic bitter taste, and contain, among other ingredients, volatile oil and tannin. They have been sometimes used to allay irritation in whooping-cough, dysentery, and various cutaneous diseases, particularly leprosy and scabies. In complaints of the skin, they are used both externally and internally in the form of decoction. When placed among clothes, they are said to prevent the attack of moths. In Germany they are sometimes substituted for hops in the preparation of beer. An oil is obtained from the leaves by distillation, which is yellow, with an intoxicating odour and a burning, aromatic taste. *L. latifolium* grows abundantly in North America. The leaves have an agreeable odour and taste, are esteemed pectoral and tonic, and, from being used as a substitute for tea, the plant has been called *Labrador Tea*. The flowers afford a great quantity of honey to the bees. The leaves of both these species, infused in beer, render it very heady and cause headache, nausea, and even delirium. That beautiful shrub, *Kalmia latifolia*, is one of the most dangerous of the whole

family. It is found all over the United States, and is there called *Mountain Laurel* and *Calico-bush*. The leaves, which are narcotic and poisonous, contain gum, tannic acid, resin, chlorophylle, fatty matter and a substance resembling mannite, an acrid principle, wax, extractive, albumen, yellow colouring matter, lignin, and salts of potassa, lime, and iron. The Indians sometimes use a decoction of the leaves to destroy themselves; and death has been occasioned even by eating the flesh of partridges and pheasants which have fed on them during the winter. Two such cases have been recorded. Applied externally, in the shape of decoction or ointment, the leaves have been found useful in scalled head, the itch, and other cutaneous affections; they have also been used advantageously in syphilis. In cases of poisoning with this plant, relief has been afforded by vomiting produced by a tablespoonful of flour of mustard mixed with warm water. A decoction of the leaves of *K. angustifolia* is used by the negroes of North Carolina as a wash for ulcerations between the toes.

Nearly allied to *Ericaceæ*, and by many botanists considered merely as sub-orders of that family, are the two following:—

ORDER CXVI.—PYROLACEÆ.—WINTER-GREENS.

THE characters which have induced botanists to separate this family from *Ericaceæ*, to which it has a very close alliance, are their very different habit; declinate styles; seeds with a loose, winged skin; and the minute embryo in the base of fleshy albumen.

GENERA AND SYNONYMES.

Cladothamnus,	Pseva, Raf.	Bryophthalmum,	„ Solenandria Palis
[Bunge.	Shortia, Torr. & Gr.	[E. M.	Blandfordia Andr
Tolmiera.	Pyrola, T.	Galax, L.	Viticella, Mich.
Chimaphila, Pursh.	Moneses, Sal.	Erythrorhiza, L.	Belvedera Gronov
Chimaza, R. Br.		[C. R.	

Natives of woods throughout the whole of the northern hemisphere.

Chimaphila umbellata grows abundantly in the United States, and is also found in the north of Europe and in Asia. It is a small evergreen plant, from four to eight inches high, and is called in America *Pipsissewa*. All parts of the plant are possessed of active properties, but it is the leaves and stems that are used. These, when fresh, exhale a peculiar odour; the taste is agreeably bitter, and somewhat sweet. The plant is diuretic, tonic, and astringent, and was long employed by the North American Indians as a remedy in scrofula, rheumatism, and nephritic affections. It is very useful in disordered digestion and general debility. *C. maculata* has similar properties. *Pyrola rotundifolia* was formerly considered a vulnerary, but has long fallen into disuse.

ORDER CXVII.—MONOTROPACEÆ.—FIR-RAPES.

THESE are parasitic plants, growing on the roots of firs and other trees. By some botanists they are regarded as a sub-order of Ericaceæ, from which they differ by the longitudinal bursting of their anthers; the loose and winged skin of the seed; and the minute embryo at the apex of the albumen. The plants have no true leaves, but their stems are covered with scales.

GENERA AND SYNONYMES.

Monotropa, Nutt.	Orobanchoides, T.	Schweinitzia, Ell.	? Corallophyllum,
Hypopithys, Dill.	Pterospora, Nutt.	Monotropsis,	[Kunth.
		[Schwein.	? Pholisma, Nutt.

They are generally found in fir woods in the north of Europe, Asia, and America. *Hypopithys europæa* is found plentifully in some parts of England in shady woods, and is called *Yellow Bird's Nest*. In Germany and Sweden the dried herb is given to sheep to cure coughs. *Pterospora andromedea*, a common plant in the neighbourhood of Niagara Falls, is employed by the natives as an anthelmintic and diaphoretic.



ORDER CXVIII.—EPACRIDACEÆ.—THE EPACRIS FAMILY.

SMALL shrubs. *Leaves* alternate, rarely opposite, often very close together, simple, entire. *Flowers* hermaphrodite, regular. *Calyx* persistent, with five lobes, rarely four, usually coloured, and surrounded with small bracts. *Corolla* tubular, sometimes divisible into five parts; limb five-cleft, rarely four, and sometimes bursting transversely from the segments. *Stamens* sometimes inserted on the receptacle and sometimes on the corolla, and equal in number to that of its lobes; *anthers* opening by longitudinal fissures. *Ovary* free, encompassed at the base by a disk, or by small scales; *style* and *stigma* simple. *Fruit* either a berry or a capsule with from two to ten many-seeded cells; sometimes a drupe with one-seeded cells. *Embryo* in the axis of fleshy albumen, with very short seed-lobes, and with a superior radicle in the drupaceous, but variable in the capsular species.

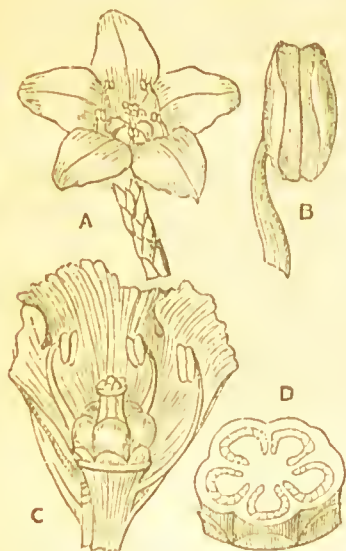


Fig. 143. A, *Epacris pulchella*; B, a stamen; C, section of the flower; D, ditto of the ovary.

TRIBE 1. *Styphylicæ*.—Cells one-seeded. Fruit generally drupaceous.

GENERA AND SYNONYMS.

<i>Conostephium</i> Benth	<i>Stenanthera</i> , R. Br.	<i>Androstoma</i> , Hook. f.	<i>Trochoearpa</i> , R. Br.
<i>Styphelia</i> , Sm.	<i>Brachyloma</i> , Sond.	<i>Leucopogon</i> , R. Br.	<i>Dacasporea</i> , R. Br.
<i>Soleniscia</i> , DC.	<i>Melichrus</i> , R. Br.	<i>Perojoa</i> , Cav.	<i>Pentachondra</i> R. Br.
<i>Astroloma</i> , R. Br.	<i>Ventenatia</i> , Cav. p	<i>Peroa</i> , Pers.	<i>Needhamia</i> , R. Br.
<i>Ventenatia</i> Cav. p	<i>Cyathodes</i> , R. Br.	<i>Monotoca</i> , R. Br.	<i>Oligarrhena</i> , R. Br.
<i>Stomarrhena</i> , DC	<i>Lissanthe</i> , R. Br.	<i>Acrotriehe</i> , R. Br.	

TRIBE 2. *Epaeræ*.—Fruit capsular; cells many-seeded.

GENERA AND SYNONYMS.

<i>Epacris</i> , Smith.	<i>Prionotes</i> , R. Br.	<i>Ponceletia</i> , R. Br.	<i>Richca</i> , R. Br.
<i>Lysinema</i> , R. Br.	<i>Cosmelia</i> , R. Br.	<i>Sprengelia</i> , Sm.	<i>Dracophyllum</i> , Lab.
<i>Julista</i> , Leschen.	<i>Andersonia</i> , R. Br.	<i>Poiretia</i> , Cav.	<i>Dacryanthus</i> Endl.
<i>Lebetanthus</i> , Endl.	<i>Atherocephala</i> ,	<i>Cystanthe</i> , R. Br.	<i>Sphenotoma</i> , R. Br.
<i>Allodape</i> , Endl.	[DC.]	<i>Piliitis</i> , Lindl.	

GEOGRAPHICAL DISTRIBUTION.—The greatest number are found in Australia; a great many are natives of New Zealand; but in the Eastern Archipelago and Polynesia they are rare. Some inhabit the Sandwich Islands, and one only in antarctic America.

PROPERTIES AND USES.—The fruit of some are eatable, but the family are most remarkable for the beauty of their flowers. The fruit of *Astroloma humifusum*, a native of New South Wales and Vandieman's Land, is the

size of a black currant, of a greenish-white or pale-red colour, and contains a thick pulp with the flavour of an apple. It is called the *Tasmanian Cranberry*; that of *Styphelia ascendens* is somewhat similar. *Lissanthe sapida*, a native of New South Wales, produces berries with an agreeable acid flavour, used by the settlers for tarts in the same way as cranberries. *Leucopogon Richei* is a native of the same country as the preceding, and is called *Native Currant*. It produces small white berries, on which a French naturalist named Riche, who was attached to D'Entrecasteaux's expedition, mainly supported himself, when he had been lost, for three days.



ORDER CXIX.—AQUIFOLIACEÆ.—HOLLY FAMILY,

TREES and shrubs. *Leaves* alternate or opposite, simple, leathery, persistent, sometimes spiny at the margin, and without leaflets at the base. *Flowers* either hermaphrodite or unisexual, regular. *Calyx* with four or six small lobes. *Corolla* with four or six deep lobes, imbricate in æstivation, inserted under the ovary. *Stamens* inserted on the corolla, alternate with its lobes, and equal in number with them. *Filaments* erect. *Anthers* two-celled, cells adnate to the sides of the filament. *Disk* wanting. *Stigma* sessile, thick, divided into a number of lobes, equal to that of the cells of the ovary. *Ovary* free, fleshy, thick, with two six or eight one-ovuled cells, with pendent ovules. *Fruit*, a berry, unopening, containing two to six one-seeded, woody, or fibrous nuts. *Seeds* suspended, with fleshy albumen. *Embryo* small, situated near the hilum, two-lobed, with a superior radicle.

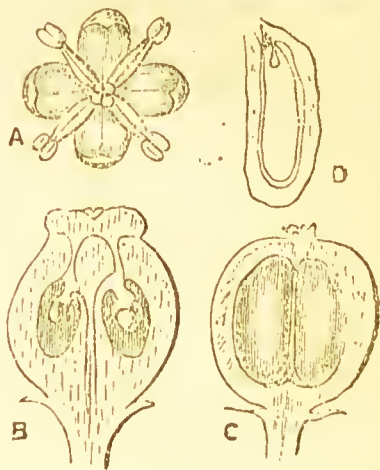


Fig. 144. A, Flower of Common Holly. B, Section of ovary. C, ditto of fruit, D, ditto of seed.

GENERA AND SYNONYMS.

Cassine, L.	Burglaria, Wendl.	Ilicioides, Dum.	? Iodina, H. & A.
Maurocenia, Mill.	Chomelia, Fl. Fl.	Byronia, Endl.	? Monetia, Herit.
Ilex, L.	Prinos, L.	Polystigma, Meisn.	Azima, Lam.
Aquifolium, T.	Ægeria, Ad.	Siphonodon, Griff.	Skimmia, Th.
Paltoria, Ruiz. & P.	Winterlia, Mün.	Villaresia, R. & P.	Rhaptostylum,
Macoucoua, Aub.	Nemopantes, Raf.	Citronella, Don.	[H. & B.
Labatia, Scop.	Nuttallia, DC.		

GEOGRAPHICAL DISTRIBUTION.—These are nowhere found in abundance. They are most numerous in the warmer regions of North America; some are found in tropical Asia, but only one in Europe.

PROPERTIES AND USES.—A bitter extractive and acrid substance, mixed with aromatic resin and glutinous matter, distinguishes this family. Some possess tonic virtues, others are purgative and emetic, while some are stimulant. *Cassine colpoon*, a native of the Cape of Good Hope, is a shrub six to ten feet high, and about a foot in diameter in the stem. It yields a tough and hard wood, which is well adapted for cabinet work, and, when varnished, looks very beautiful. The most useful of the whole family is the *Common Holly* (*Ilex aquifolium*). This is a native of the woods and forests of Britain; and its numerous varieties of gold and silver-blotched, entire, notched, serrated, ciliated, bristly, broad, narrow, and thick-leaved, and yellow-berried, are beautiful ornamental trees in parks and shrubberies; and especially in winter, when covered with a profusion of bright scarlet berries,

a large holly-tree is perhaps the queen of the woodland. For a fence there is no better tree than the holly. It never suffers from the severest winter; it is always green, strong, and impenetrable, and it is easily kept in order. The leaves are mucous, bitter, and astringent, with an austere taste; they were formerly used as a diaphoretic, and, in infusion, were considered beneficial in catarrh, pleurisy, small-pox, and gout. A few years ago, they were highly extolled in France as a cure for intermittents, and were considered equal to Peruvian bark, their febrifuge virtues being said to depend on a bitter principle called *ilicin*. The berries are powerfully purgative, and also act as an emetic and diuretic; ten or twelve will act on the bowels. The expressed juice has been used in jaundice. From the bark the substance called *bird-lime* is obtained, by boiling it for some hours in water, till the green part separates from the white; then laying it in a cool cellar for a few days; afterwards pounding it till it becomes a tough paste, washing it frequently, till it becomes clear, and then placing it in an earthen vessel, to ferment or become fine, when it will be fit for use. The wood is hard, with a fine grain, and a colour almost as white as ivory, except at the heart of old trees, where it is brown; it is capable of receiving a high polish, and is readily stained of any colour, but the most common is black in imitation of ebony. It is much used for inlaying and cabinet-work, and it forms a considerable ingredient in Tonbridge-ware; it also forms handles to knives, and has even been used for wood engraving. *I. perado* and *I. laziflora*, natives of North America, possess the same properties.

Ilex vomitoria has been erroneously called *South-Sea Tea*, from the supposition that it was the same plant as *I. paraguensis*; but this also has been used as tea in Carolina, where it grows abundantly along the sea-coast. The early settlers made general use of the leaves for this purpose, one of whom says: "The method I used with it was to dry it hastily in an iron pot, and then put boiling water to it, as is usual in making tea; and the flavour was very agreeable." It was called by the Indians *Cossena*, and the leaves were used for smoking, as a substitute for tobacco. "Often," says one of the early settlers, "I have smoked a pipe of Cossena with their majesties Toma Chaci and Senoaki, his queen, at their mud palace, about three miles from Savanacke." The leaves are also powerfully emetic, and a decoction of them was formerly used by the Indians under the name of "black drink," both as a medicine and a drink of etiquette at their councils. *I. duhoon* has similar properties. *Ilex paraguensis*, or *Paraguay Tea*, grows abundantly in Paraguay and Brazil, where it is called *Matte*. The leaves of this plant are used over almost the whole of South America, as we do tea; and in Paraguay the Jesuits make a large revenue from this source. It is an article of daily use among the people, and they suck the infusion through a tube. About four millions of pounds are annually exported from Paraguay, one-half of which goes to Chili, and the remainder to Buenos Ayres. The leaves, when fresh, have a balsamic odour and a bitter taste, and are at first disagreeable. According to analysis, they contain a principle identical with the caffeine of tea and of coffee, and, like them, contain also tannic acid. *I. gongonha*, a native of Brazil, has similar properties, and its leaves are also used as Paraguay tea, but they are of a much inferior quality. The fruit of *I. macoucoua* contain a great quantity of

tannin, and mixed with a ferruginous mud, are used to dye cotton; and they act somewhat like galls. *Prinos verticillatus* is a large shrub growing in all parts of the United States, and there called *Black Alder*. Its berries have a bitter, sweetish, and somewhat acrid taste, and its bark is considered tonic and astringent, and is used in healing ill-conditioned ulcers and chronic cutaneous eruptions, by administering it internally either in powder or decoction, and by external application, either in the form of a wash or poultice.



ORDER CXX.—OLEACEÆ—OLIVE FAMILY.

TREES and shrubs. *Leaves* opposite, simple, rarely pinnate. *Flowers* hermaphrodite, regular.

Calyx four-lobed or four-toothed, rarely almost wanting. *Corolla* four-lobed, monopetalous, rather valvate in æstivation. *Stamens* two, alternating with the divisions of the corolla, and adnate to it. *Antthers* two-celled, bursting longitudinally. *Ovary* simple, girded by no glandular disk, two-celled, the cells two-seeded, alternate with the stamens. *Ovules* pendulous, eollateral. *Style* simple or wanting. *Stigma* two-lobed or entire.

Fruit a drupe, a berry, or a capsule, often one-seeded by abortion. *Seeds* pendulous, with a dense abundant



Fig. 145. *Olea europæa*. A, section of the calyx and ovary of the Privet.

albumen, which is sometimes wanting. *Embryo* straight, half the length of the seed, with leafy seed-lobes, a superior radicle, and an inconspicuous plumule.

TRIBE 1. *Syringææ*.—Fruit dry, capsular, two-celled, with a loculicidal dehiscence. Flowers hermaphrodite. Corolla tubular. Seeds albuminous.

GENERA AND SYNONYMES.

Fontanesia, Lab.

Desfontanesia, Hoffms

Forsythia, Vahl.

Rangium, Juss.

Nathusia, Hochst.

Syringa, L.

Lilac, T.

Schrebera, Rozb.

TRIBE 2. *Oleaceæ*.—Fruit fleshy, drupaceous or baccate. Seeds albuminous.

GENERA AND SYNONYMES.

<i>Olea</i> , <i>L.</i>	<i>Stereoderma</i> , <i>Bl.</i>	<i>Rhysospermum</i> , <i>Gart.</i>
<i>Piceonia</i> , <i>A. DC.</i>	<i>Pachyderma</i> , <i>Bl.</i>	<i>Osmanthus</i> , <i>Lour.</i>
<i>Visiania</i> , <i>A. DC.</i>	<i>Myxopyrum</i> , <i>Bl.</i>	<i>Phillyrea</i> , <i>T.</i>
<i>Kellana</i> , <i>A. DC.</i>	<i>Notelaea</i> .	<i>Ligustrum</i> , <i>T.</i>
<i>Myrsine</i> , <i>Hochst.</i>		

TRIBE 3. *Chionanthæ*.—Fruit drupaceous, fleshy. Seeds without albumen.

GENERA AND SYNONYMES.

<i>Chionanthus</i> , <i>L.</i>	<i>Miuntia</i> , <i>Fl. Fl.</i>	<i>Mayepea</i> , <i>Aub.</i>
<i>Linociera</i> , <i>Sw.</i>	<i>Noronhia</i> , <i>Stadm.</i>	<i>Freyeria</i> , <i>Scop.</i>
<i>Thouinia</i> , <i>L.</i>	<i>Binia</i> , <i>Nor.</i>	<i>Tetrapilus</i> , <i>Lour.</i>
<i>Ceranthus</i> , <i>Schreb.</i>	<i>Boaria</i> , <i>A. DC.</i>	

GEOGRAPHICAL DISTRIBUTION.—Natives of the temperate regions, particularly of the northern hemisphere; rare between the tropics of Asia and America. All the *Oleæ* and *Chionanthæ*, except the Privet, delight in the warmer and sub-tropical parts.

PROPERTIES AND USES.—In the tribe *Syringæ* we have some of our most beautiful flowering shrubs, as the *Lilac* (*Syringa vulgaris*), or *Lilach*, which is its Persian name. The green fruit of this shrub has a distinctly bitter taste, without any mixture of acidity. From them a soft extract has been prepared, which has very marked tonic and febrifuge properties.

The *Olive* (*Olea europæa*) is supposed to be originally from Asia. It grows wild in Syria, and is now naturalised in the south of France, Italy, and Spain, where it is found in hedges and thickets. The culture of the Olive is one of the principal commercial resources of the countries of Southern Europe. The Olive is from fifteen to twenty feet, or more, in height, having the growth of a bushy tree; its flowers are small and whitish, and its fruit is an oval drupe or plumb, of a greenish, whitish or violet colour, with a stone in the centre; and it is in the exterior flesh that the oil is contained. There are several varieties of the cultivated Olive. The long-leaved is that which is generally grown in the south of France and Italy, and the broad-leaved is mostly grown in Spain. From the former the finest oil is obtained; and the latter, which is nearly double the size of the other, produces an oil of a strong, rank flavour, not at all appreciated in this country, though eaten with great relish in Spain. The oil is obtained by pressure. In November, when the fruit is fully ripe, it begins to redden, and, when gathered, is carried to a mill and bruised, the stones being set at such a distance that they do not crush the nut of the olives. The flesh covering the nut, and containing the oil in its cells, being thus prepared, is put into bags made of rushes, and moderately pressed; and thus is obtained, in considerable quantity, a greenish, semi-transparent oil, which, from its superior excellence, is called Virgin Oil. The pulp, after the first pressure, is moistened with water, and again pressed; and this oil, though inferior to the first, is of good quality, and fit for table. The pulp is again broken to pieces, soaked in water, and left to ferment in large cisterns, and is again pressed; but the oil from this pressure is of a very common description, and is generally used for making soap, and for other manufacturing purposes. *Olive oil* may be said to form

the bitter and cream of Spain and Italy. It is very nutritious, and is very extensively used as an article of food; and there can be no doubt that it is more wholesome in warm climates, and more congenial to the human constitution, than butter. According to Braconnot, the oil contains seventy-two parts of olein and twenty-eight of margarin. It is solidified by nitrous acid, and by nitrate of mercury, and converted into a peculiar fatty substance, which has received the name of *elaidin*. Taken medicinally, it is a mild laxative, and subdues irritation of the intestines. It has also been recommended as a remedy for worms. Applied externally, it serves to relax the skin. The fruit is prepared as a pickle, by repeatedly steeping them in water, to which quick lime, or any alkaline substance, is sometimes added, to shorten the operation. They are afterwards soaked in pure water, and then taken out and boiled in salt and water, with or without an aromatic. They are supposed to excite appetite and promote digestion. The leaves and barks have an acrid and bitter taste, and have been employed as substitutes for Peruvian bark, but with little success. In some countries, a kind of gum-resin exudes from the bark, which, on analysis, was found to contain a peculiar principle analogous to gum, which has received the name of *olivile*. *Olea (osmanthus) fragrans*, the *Fragrant Olive*, is a native of Japan and China, and is a shrub six to ten feet high, cultivated for the sake of its sweet-scented flowers, which are said to be put into some kinds of tea, to communicate a flavour. The fruit of *O. americana* are eatable. *O. verrucosa* grows abundantly at the Cape of Good Hope, and attains a height of eight or ten feet. The wood is very compact and heavy, and, on account of its density and extreme hardness, even wears out iron. *O. laurifolia* also a native of the same colony, is called by the settlers *Black Iron-Wood*. The wood is heavy, close-grained, and hard, and is much used for furniture and for agricultural implements. *O. capensis* is called *Ironwood* by the Dutch settlers, and the wood is used for the same purposes as the others; its fruit is eatable. The *Common Privet* (*Ligustrum vulgare*), so commonly used for hedges and in shrubberies, is a native of some parts of Britain. Its wood is very hard. From the pulp of the berries a rose-coloured pigment may be obtained. With the addition of alum, they dye wool and silk of a good, durable green; for this purpose they must be gathered as soon as they are ripe; they continue on the shrub till spring, and in times of scarcity are eaten by different sorts of birds, particularly the bullfinch. The leaves have an astringent, bitter taste, and the flowers, which have a delightfully sweet fragrance, have been used in the form of decoction for sore throat, and aphthous and scorbutic ulceration of the mouth. On analysis, the bark was found to contain a peculiar substance, which was called *ligustrin*, besides mannite, sugar, mucro-saccharine matter, starch, chlorophylle, bitter extractive, bitter resin, tannin, albumen, and salts.

ORNACEÆ.—THE ASH FAMILY.

HITHERTO these have been included in Oleaceæ; but in their polypetalous corolla, the hypogynous insertion of the stamens, their unisexual flowers and samaroid (winged) seeds, they essentially differ, and appear to approach more closely to the Maples, in the neighbourhood of which they ought to be placed. The sweet, sugary juice seems also to indicate the affinity.

GENERA.

Fraxinus, L. | *Ornus*, Pers.

The greatest number of species are found in North America, and the rest are distributed throughout the temperate parts of Europe and Asia.

The timber of the *Common Ash* (*Fraxinus excelsior*) is very tough and hard, and is generally used in the construction of agricultural implements, handles to tools, and other rural appliances. It is extensively grown for hop-poles, and the timber is so elastic that a joist of it will bear more before it breaks than one of any other European tree. It ranks next in value to that of the oak, and is even said to surpass it for some purposes. The ashes of the wood furnish very good potash. The bark is used for tanning cat-skin and nets, and on account of its astringency and bitterness has been used as a substitute for Peruvian bark. In some parts of the country, the leaves are used to feed cattle, when grass is scarce in autumn, and they have been gathered to mix with tea; a decoction of them is aperient. If cows eat the leaves or shoots, the butter becomes rank, as we have often experienced. There are some singular superstitions connected with this tree. In some parts of the country, the common people split a young ash, and pass their distempered children through the chasm, in hopes of a cure. They also bore a hole in an ash, and fasten a shrew mouse in it; a few strokes with a branch from the tree so treated, are considered a remedy for cramps and lameness in cattle, which are ignorantly supposed to proceed from this harmless animal. In many parts of Scotland, on the birth of a child, the nurse or midwife puts one end of a green stick of this tree in the fire, and receiving the sap or juice which oozes out at the other, administers this as the first spoonful of liquor to the new-born babe. From *Ornus europæa*, the *Flowering* or *Manna Ash*, and *O. rotundifolia*, the substance called *manna* is obtained. It is the concrete juice of both of these trees which exudes after wounding the bark. The trees grow spontaneously in Italy and Sicily, whence the finest manna is brought. Manna is a gentle tonic, usually operating mildly, but in some cases produces flatulence and pain. On analysis, it was found to contain, 1, a peculiar crystallisable sweet principle, which constitutes seventy-five per cent.; 2, true sugar; 3, a yellow, nauseous matter, upon which the purgative property is thought chiefly to depend; and, 4, a small quantity of mucilage. *Mannite* is white, inodorous, crystallisable in semi-transparent needles, of a sweetish taste; soluble in five parts of cold water, scarcely soluble in cold alcohol, but readily dissolved by that liquid when hot, and deposited when cool. Unlike sugar, it is incapable of undergoing the vinous fermentation.

ORDER CXXI.—EBENACEÆ.—EBONY FAMILY.

TREES or shrubs. *Leaves* alternate, entire, leathery, and without leaflets at their base. *Flowers* unisexual, rarely hermaphrodite, regular. *Calyx* persistent, with three or six nearly equal divisions, in some cases acquiring a great development at the time the fruit is matured. *Corolla* pitcher-shaped, slightly coriaceous with three or six lobes, generally downy inside. *Stamens* double or triple in number the lobes of the corolla, rarely equal in number; *filaments* simple in the hermaphrodite flowers, and double in the polygamous and dioecious ones. *Ovary* free, sessile, not girded by a disk, with three or more cells. *Style* simple or two-cleft. *Fruit* a berry, globular or oval, generally few-seeded by abortion, having the bark or rind sometimes separating. *Seed* with a membranous skin and cartilaginous albumen. *Embryo* slender, straight, white, rather longer than half the length of the albumen; *seed-lobes* leafy, rather veiny, lying on each other; *radicle* long, taper, and turned towards the hilum.



Fig. 146. *Roylena hirsuta*. B, section of the fruit. C, ditto of the seed.

GENERA AND SYNONYMES.

<i>Royena</i> , L.	<i>Rospidios</i> , A. DC.	„ <i>Hebenaster</i> Rmph.	<i>Cargillia</i> , R. Br.
<i>Euclea</i> , L.	<i>Macreightia</i> , A. DC.	<i>Paralea</i> , Aubl.	<i>Maba</i> , Forst.
<i>Rymia</i> , Endl.	<i>Diospyros</i> , L.	<i>Embryopteris</i> ,	<i>Perreola</i> , Roxb.
<i>Diplonema</i> , Don.	<i>Noltia</i> , Schum.	[Gärt.	<i>Pissonia</i> , Rottb.
<i>Kellaua</i> , A. DC.	<i>Guajacana</i> , T.	<i>Cavanilla</i> , Lam.	<i>Ebenoxylon</i> Lour
<i>Gunisanthus</i> , A. DC			<i>Holochilus</i> , Daltz.

DOUBTFUL GENERA.

<i>Diclidanthera</i> , Mart.	<i>Thuraria</i> , Molin.	<i>Gœtzea</i> , Wydl.
<i>Pluchia</i> , Fl. Fl.		

GEOGRAPHICAL DISTRIBUTION.—These are generally found in Asia between the tropics; but in Australia beyond the tropics, and in the tropical and warmer parts of North America, as well as in southern Europe, they are rare.

PROPERTIES AND USES.—*Royena lucida* is called the *African Bladder-nut*; but at the Cape of Good Hope, of which it is a native, it is known by the name of *Zwartbast*. It is a shrub from six to twelve feet high, and produces a fruit like a berry, red above and pale below, containing a firm, whitish flesh, like that of an apple. It produces a hard and tough wood, of a yellowish colour, striped with brown, and is used in making furniture and tools. *Euclea racemosa*, a large shrub growing at the Cape of Good Hope, has a hard, heavy wood, used by the settlers for wooden screws; and *E.*

undulata has a hard, brown-coloured wood, useful for cabinet-work; the berries of the latter have a sweet taste, and are eaten by the Hottentots. Bruised and fermented, they yield a vinegar like that made from wine. *Diospyros Lotus* is the *European Lote*, or *Date Plum*, and grows wild in countries bordering the Mediterranean. It produces fruit of the size of a cherry, of a yellow colour and a sweet, astringent taste, and it has been recommended as a cure for diarrhœa. *D. decandra*, a native of Cochin China, bears a large berry, of a yellow colour when ripe, with an austere and somewhat sweet taste and disagreeable smell; but it is eaten and sold in the markets in the northern provinces of Cochin China. The wood, when of sufficient age, is of a fine, compact, regular grain, heavy, very white, veined with black, and sometimes black at the heart, and is highly esteemed for cabinet-work. The fruit of *D. psidioides*, a native of Peru, is an inch in diameter, with an ungrateful smell and an insipid taste. *D. kaki*, a native of Japan, produces a fruit like a yellow plum, which the Japanese eat to such an extent as sometimes to cause an attack of diarrhœa. It is sometimes imported to this country, from China, as a dried sweetmeat. It is preserved in the same manner as the fig.

Diospyros virginiana is a lofty tree, sixty feet high, very common in the middle and southern states of America, and is there called *Persimmon*. When ripe, the fruit is round, of the size of an ordinary plum, and of a dark-yellow colour, containing a soft yellow pulp, in which the seeds are enclosed. When green, the fruit is very harsh and astringent; but when perfectly ripe, and after it has been subjected to frost, it is sweet, glutinous, and agreeable. Michaux says, that in the southern and western states, it is made into cakes with bran, and used for making beer, with the addition of water, hops, and yeast. A spirituous liquor is obtained by distillation, the infusion has been fermented. The unripe fruit contains tannic acid, sugar, malic acid, colouring matter, and lignin; and it has been used advantageously in diarrhœa, chronic dysentery, and uterine hemorrhage. The wood is very hard, but brittle and white, and is very good for joiners' tools, such as planes; but it soon rots when exposed to the weather. The bark has been employed as a febrifuge, and has been administered with success in cases of cholera infantum and Mississippi diarrhœa. The *Ebony* wood, so highly valued as a cabinet wood, is the produce of several species of *Diospyros*, and those which are known to yield it in greatest abundance are *D. ebenaster*, *D. melanoxydon*, *D. cordifolia*, *D. mabola*, *D. tomentosa*, *D. Roylei*, and several others, all natives of the East Indies. *Embryopteris gelatinifera*, a native of the East Indies, produces fruit which is eaten by the natives when ripe, but it is very astringent. The fruit contains a viscid juice, and is used all over the country for paying the bottoms of boats. The unripe fruit contains a large proportion of tannin; and an infusion of them is employed to steep fishing-nets in, to make them more durable.

ORDER CXXII.—STYRACACEÆ—STORAX FAMILY.

TREES or shrubs, generally covered with star-like down. *Leaves* simple, alternate, entire, and without leaflets at their base. *Flowers* hermaphrodite, regular, and bracteated. *Calyx* free, tubular, with an almost entire border, increasing and half enclosing the fruit. *Corolla* with five petals, valvate in æstivation. *Stamens* numerous, inserted in the corolla, always in a single series; *anthers* linear, oblong, almost as long as the filaments. *Ovary* superior, with an epigynous gland on its apex, three-celled at the base, one-celled at the summit, with several ovules in three rows, the upper row erect, the middle horizontal, and the lower pendulous from a free central bearer; *style* simple; *stigma* three-lobed, somewhat capitate. *Fruit* a drupe, somewhat fleshy, containing a one-celled nut with one, two, or three erect seeds. *Embryo* in a fleshy albumen, with a taper radicle pointing to the hilum, and as long as the leafy seed-lobes.



Fig. 147. *Styrax officinale*. A, vertical section of ovary of *S. leiophylla*; B, transverse ditto.

GENERA AND SYNONYMS.

<i>Styrax</i> , T.	„ Benzoin, Hayn.	<i>Trichogamila</i> , P.	<i>Halesia</i> , Ellis.
<i>Epigenia</i> , Fl. Fl.	<i>Tremanthus</i> , Pers	[Br.	<i>Pamphilia</i> , Mart.
<i>Lithocarpus</i> , Bl.	<i>Cypellium</i> , Desv.	<i>Pterostyrax</i> , Lieb.	<i>Faveolaria</i> , A. DC.
			<i>Cypellium</i> , Desv.
			<i>Cyrta</i> , Lour.

GEOGRAPHICAL DISTRIBUTION.—They are not unfrequent between the tropics of Asia, and particularly of America. In Japan and the warmer parts of North America, and on the eastern shores of the Mediterranean, they are rare.

PROPERTIES AND USES.—The Gum Resin called *Storax* is obtained from *Styrax officinale*. This is a tree from fifteen to twenty feet high, a native of Syria, but now found in the Levant, Italy, Syria, Spain, and the south of France; but in the last-mentioned country it does not yield any of the resin. *Storax* is procured by wounding the bark of the tree, when the juice exudes and becomes concrete. Some of it is in the form of reddish-

yellow tears about the size of a pea, opaque, soft, and adhesive, and this is called *Storax in grains*; another is in dry brittle masses, formed of adhesive tears, and, from being wrapped in the leaves of a kind of reed, is called *Storax calamita*. Storax has a fragrant odour and aromatic taste, and as it contains volatile oil and resin, and yields benzoic and cinnamic acids by distillation, it ranks as a balsam. It is stimulating and expectorant, and was formerly recommended in phthisis, chronic catarrh, asthma, and amenorrhœa, but is now seldom used. *Benzoin*, or *Benjamin*, is a gum resin formed by the concrete juice of *Styrax benzoin*. The tree grows in Borneo, Siam, Java, and other islands of the Indian Archipelago, where it attains a large size; and it is by wounding the bark, and allowing the juice to exude and become hardened by exposure, that the resin is obtained. Benzoin has a sweet, peculiar, and agreeable odour, which is increased by friction. Its taste is sweetish, somewhat resinous, balsamic, and, when chewed, is irritating to the mouth and fauces. It is easily pulverised, and, when heated, melts and emits thick, white, pungent fumes, which consist chiefly of benzoic acid. It is entirely soluble in alcohol. According to the analysis of Bucholz, 1,500 parts of benzoin yielded 187 of benzoic acid; 1,250 of resin; 25 of a substance resembling Peruvian balsam; 8 of a peculiar aromatic principle, soluble in alcohol and water; and three of ligneous fibre. In its medical properties it is stimulant and expectorant; and was formerly employed in chest affections. *Benzoic acid*, when pure, is inodorous, and its taste pungent and bitter. It is used as a stimulant and diaphoretic of considerable power. In India it is used by the Hindoos to burn in their temples. The milky liquor resulting, from the addition of water to the alcoholic solution is used as a cosmetic, under the name of *Virgin's Milk*.



ORDER CXXIII.—SAPOTACEÆ.—SAPODILLA FAMILY.

TROPICAL trees. *Leaves* alternate, simple, leathery, without leaflets

at their base. *Flowers* hermaphrodite, regular. *Calyx* monosepalous, with four or eight obtuse divisions, regular, permanent. *Corolla* divided into the same number of equal lobes as the calyx. *Stamens* inserted in the petals; the fertile ones opposite the lobes of the corolla, and alternating with as many sterile ones; *anthers* generally turned outwards. *Ovary* superior, many-celled; cells one-ovuled; ovules erect; style one; stigma undivided, sometimes lobed. *Fruit* a berry, many-celled, or only one-celled from abortion. *Seeds* nut-like, with a bony covering. *Albumen* fleshy when present, but sometimes wanting. *Embryo* large, white, erect, with leafy seed-lobes in those seeds furnished with albumen, and fleshy in those without, and with a short, straight radicle inclining towards the hilum.

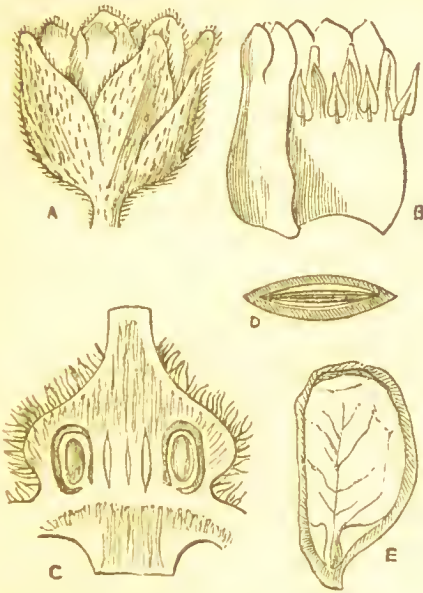


Fig. 148. A, Flower of *Achras sapota*; B, corolla and stamens; C, section of ovary; D, ditto of seed; E, embryo.

GENERA AND SYNONYMES.

<i>Chrysophyllum</i> , L.	<i>Sapota</i> , Plum.	<i>Achras</i> , L.	<i>Imbricaria</i> , Com.
<i>Nycterisition</i> ,	<i>Achras</i> , P. Br.	<i>Bumelia</i> , Sw.	<i>Binectaria</i> , Frsk.
[R. & P.	<i>Hormogyne</i> , A. DC.	<i>Lycioides</i> , L.	<i>Mimusops</i> , L.
<i>Cainito</i> , Tussac.	<i>Mimusops</i> , A. Cunn.	<i>Labourdonnaisia</i> ,	<i>Elengi</i> , Rheed.
<i>Ecclimusa</i> , Mart.	<i>Sersalisia</i> , R. Br.	[Boj.	<i>Manilkara Rheedea</i>
<i>Pouteria</i> , Aub.	<i>Sideroxylon</i> , L.	<i>Azaola</i> , Blanco.	<i>Phebolithis</i> , Gärt.
<i>Chaetocarpus</i> , L.	<i>Robertsia</i> , Scop.	<i>Paysona</i> , A. DC.	<i>Synarrhena</i> , F & M
<i>Labatia</i> , Mart.	<i>Argania</i> , R. & S.	<i>Bassia</i> , König.	<i>Omphalocarpum</i> ,
<i>Lucuma</i> , Molin.	<i>Isonandra</i> , Wight.	<i>Palaquium</i> , Blanco	[Palis.
<i>Guapeba</i> , Com.	<i>Dipholis</i> , A. DC.	<i>Micadenia</i> , R. Br.	? <i>Rostellaria</i> , Gärt.
<i>Vitellaria</i> , Gärt.			? <i>Macria</i> , Tenore.

GEOGRAPHICAL DISTRIBUTION.—They inhabit the tropical regions of the whole world, but in Australia, the Cape of Good Hope, the north-west of Africa, and in the warmer parts of North and South America they are rare.

PROPERTIES AND USES.—Many have fleshy, succulent fruit, which are eatable, and which yield a fat oil from their seeds, and the bark of some is bitter, astringent and febrifuge. The fruit of *Chrysophyllum cainito*, or *Star Apple*, is large, rose-coloured, mixed with green and yellow. The pulp is soft, clammy, sweet, and insipid. The tree, which is not above ten feet high, grows abundantly in all the West India islands and South

America, where the inhabitants of Cayenne and Guiana eat the fruit under the name of "yolk of eggs." They are also eaten in America, but are not acceptable to Europeans. *C. Roxburghii*, which grows in Silhet, produces fruit the size of a crab, which, when ripe, has a smooth yellow skin and a firm pulp, which is so clammy that it adheres to the lips or knife, and although it has an insipid flavour it is greedily eaten by the natives. Several other species produce fruit which are eatable in their native country, but they are of no real interest. *C. glycyphlæum*, a tree growing in the forests about Rio Janiero, yields from its bark, by extract, a substance called *Monesia*. It comes from South America in cakes weighing rather more than a pound; is of an almost black colour; the taste is sweet at first, but afterwards astringent, and ultimately acrid. It is insoluble in water. It has been used in Franco as a moderate stomachic excitant, a general alterative, and a feeble astringent. Used internally, it has been successful against diarrhoea, hæmoptysis, menorrhagia, scrofula, scurvy, the chronic catarrhs of old people, and dyspepsia. Applied externally, it has been successful against leucorrhœa, ulcerations of the mouth and fauces, spongy and scorbutic gums, carious teeth, and obstinate, scrofulous, and otherwise unhealthy ulcers on the surface. The bark being analyzed was found to contain in 100 parts 1·2 of stearine, chlorophylle, and wax; 1·4 of glyeyrhizin; 4·7 of an acid principle, analogous to saponin, called *monesin*; 7·5 of tannic acid; 9·2 of a red colouring substance; 1·3 of malic acid and malate of lime; 3·0 of various salts, including silica and oxides of iron and manganese; and 71·7 of pectic acid, or pectin and lignin, including loss, besides traces of an aromatic principle and of gum. *Monesinis*, in the form of transparent, yellowish scales, easily pulverized and forming a white powder; dissolves readily in alcohol and water, to the latter of which it gives the property of frothing, but is insoluble in ether; this is supposed to be the acrid principle of the bark.

The *Mammee Sapota* (*Lucuma mammosa*) is a lofty tree, a native of the tropics of America and the West India islands, where it is also cultivated for its fruit. It produces a large oval fruit, with pulp like quince marmalade, having a luscious flavour, and hence it is called American Marmalade. The kernels abound in prussic acid, and even a small portion of one introduced to the stomach causes sickness and coughing. A variety of the tree is called in Jamaica the *Bully Tree*, because it overtops all the others in the woods. Several other species of *Lucuma* produce fruits which are eaten by the natives of the countries where they grow, but they are of no value. Some of them yield timber which is hard and durable, and is used for various economical purposes. The *Sapota*, or *Sapodilla Tree*, (*Sapota achras*) sometimes attains as much as fifty feet high. It grows in South America and the West India islands, and its fruit, which is larger than a quince, is by some considered very agreeable. The kernels of the fruit are very bitter, and may be used occasionally in strengthening emulsions. The wood of the species of *Sideroxylon* is very hard, and is called *Iron-wood*; that of *S. inerme*, a native of the Cape of Good Hope, where it is called *Melkhout*, is very hard, close, and durable, and is extensively used for boats and bridges, and also for agricultural implements. *Galimeta wood* is *Bumelia sulcifolia*, a native of Jamaica. The bark of *B. nigra* is bitter, astringent, and febrifugal. The fruit of *B. retusa*, called in Jamaica

Bastard Bully Tree, is said to be milky; and that of *B. lycioides* is austere, with a degree of sweetness, and is useful in diarrhoea. *Isonandra gutta* is the tree which yields *Gutta percha*. It is of a large size, and has a trunk three feet in diameter. It grows abundantly at Singapore, Borneo, and other islands of the Malayan archipelago. *Gutta Percha* is obtained by cutting notches in the bark, when a milky juice exudes which soon hardens. Its specific gravity is 0.9791. At 150 degrees or 160 degrees of Fahrenheit it becomes soft and very plastic, either by means of hot water or a dry heat. Exposed to a heat of 330 degrees, it loses a portion of water, and, on hardening, becomes translucent and grey. Subjected to igneous distillation, it yields volatile products, resembling closely the volatile oil obtained from caoutchouc by the same process. Heated in an open vessel, it melts, foams up, and takes fire, burning with a brilliant flame and smoke. A portion thus melted retains the state of a viscid fluid on cooling. It is a non-conductor of electricity. It is insoluble in water, alcohol, alkaline solutions, and the weak acids. Ether and the volatile acids soften it when cold, and dissolve it with the aid of heat. Oil of turpentine perfectly dissolves it, forming a clear colourless solution, which yields it unchanged by evaporation. It is also dissolved by bisulphuret of carbon, chloroform, and benzole. Its uses are now so common that we need not speak of them here. To give it greater pliability it is sometimes mixed with the tar resulting from the igneous decomposition of caoutchouc, or with its own tar and lampblack, and it is vulcanized in the same manner as caoutchouc. When dissolved it makes an excellent varnish, impervious to wet.

Bassia longifolia is a lofty tree, the branches of which are clothed with a grey down. It is a native of Malabar, Coromandel, and Ceylon, and is called by the Talmuls *Illiepi*, and by the Cingalese *Miele*. An oil is expressed from the fruit which is used for burning in lamps and for making soap; and it is a common substitute for ghee and cocoa-nut oil, in the curries and other dishes of the common people; with it they also make cakes, from the sale of which many get a livelihood. The cake left after the oil is expressed is used for washing the head, and is carried as a small article of trade to those countries where these trees are not to be found. The common people gather the flowers, dry them in the sun, and, when roasted, use them as food. They are also boiled and bruised into a jelly, and made into small balls, which they sell or exchange for fish, rice, &c. The leaves are boiled with water, and given as medicine in several diseases. The milk of the green fruit and tender bark is given as a medicine. The bark is a cure for the itch. The wood is as hard and as durable as teak, but not so easily worked, nor is it procurable of such a length. Squirrels, lizards, country dogs, and jackals eat the flowers, and it is said that the latter are apt to grow mad by too much feeding on them. *B. latifolia* is also a native of India, and is called *Madhaca* in the Sanscrit, *Ipie* by the Telingas, and *Mahva* and *Muhooa* by the Bengalese. The flowers are eaten raw by the natives of the mountainous parts of the Circars, and by jackals. An ardent spirit is distilled from them which is strong and intoxicating, and is so cheap that for the value of one halfpenny sterling as much as the measure of an English pint may be obtained. The seeds yield a large quantity of oil by expression, which is only used by the common people for burning. *B. butryacea*, a native of Nepaul, and called by the natives *Fulwah*, or *Phulwarah*, produces a fine vegetable

butter. The kernels of the fruit are bruised into the consistence of cream, which is then put into a cloth bag, with a moderate weight upon it, and left to stand till the oil or fat is expressed, which becomes immediately of the consistence of hog's-lard, and is of a delicate white colour. Its uses in medicine are much esteemed in rheumatism and contraction of the limbs. It is also used by natives of rank, perfumed, as an unction. From the fruit of *B. Parkii* the natives of Bambara, in Africa, also make a butter, by first drying the fruit in the sun, and then boiling the kernel in water. This is the *Stea Tree* mentioned by Mungo Park in his travels. The flowers of *Mimusops elengi* are very aromatic, and yield a fragrant water by distillation. The seeds contain a great quantity of oil, which is used by painters, and is said to be useful in parturition. The tree is about fifteen or twenty feet high, a native of the East Indies, and is called *Bukul* in Bengal, *Elengi* in Malabar, *Mulsari* in Hindostan, and *Pagadoo* by the Telingas.



ORDER CXXIV.—MYRSINACEÆ—MYRSINE FAMILY.

TREES or shrubs. *Leaves* alternate, very rarely opposite, or ternate,

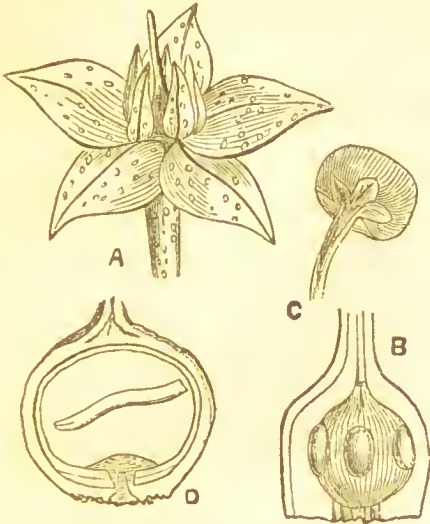


Fig. 149. A, Flower of *Ardisia nana*; B, section of ovary; c, fruit; D, section of the fruit and seed.

smooth, leathery, entire or dentate, without leaflets at their base. *Flowers* regular, generally hermaphrodite, sometimes, but rarely, unisexual. *Calyx* generally persistent, with four or five deep divisions. *Corolla* regular, with four or five lobes. *Stamens* equal in number to the lobes of the corolla, sometimes united in one bundle, attached to the base of the lobes, and opposite them, sterile or fertile; *anthers* turned outwards or inwards. *Ovary* free, or slightly adherent, one-celled, containing a variable number of ovules, inserted on a free central bearer; *style* simple, terminated by a simple or lobed stigma. *Fruit* a drupe, or berry-like, containing from one to four seeds, sometimes a many-seeded foliicle. *Seeds* with a concave hilum. *Albumen* fleshy, horny, or wanting, with a cylindrical

embryo, somewhat curved, and lying across the hilum.

TRIBE 1. *Theophrasteæ*.—Corolla furnished with appendages. Sterile stamens alternate with fertile ones. Anthers turned outwards. Ovary free. Fruit many-seeded.

GENERA AND SYNONYMES.

<i>Jacquinia</i> , L.	<i>Eresia</i> , Plum.	<i>Reptonia</i> , A. DC.	<i>Merretia</i> , Sol.
<i>Bonellia</i> , Bert.	<i>Theophrasta</i> , L.	<i>Edgworthia</i> , Falc	? <i>Othera</i> , Thunb.
<i>Theophrasta</i> , Juss.	? <i>Oneinus</i> , Lour.	<i>Corynocarpus</i> , Forst	? <i>Orixia</i> , Thunb.
<i>Clavija</i> , Ruiz. & Pav.	<i>Monothea</i> , A. DC.		

TRIBE 2. *Ægiceriæ*.—Anthers bursting transversely. Fruit a foliicle, many-seeded. Seeds without albumen, and vegetating in their seed-vessels, like the mangrove.

GENUS AND SYNONYME.

Ægiceras, Gärtn.
Malaspinæa, Presl.

TRIBE 3. *Mæseæ*.—Stamens all fertile. Anthers turned inwards. Ovary adherent or half-adherent. Fruit many-seeded.

GENUS AND SYNONYMES.

Mæsa, Forsk.
Bæobotrys, Forst.
Sibouratia, Thouars.

TRIBE 4. *Embeliææ*.—Corolla polypetalous. Ovary free. Ovules few or solitary. Seeds indusiate.

GENERA AND SYNONYMES.

Embelia, *Burm.*
Ribesoides, *L.*
Dauceria, *Dennst.*

Choripetalum, *A.DC.*
Samara, *L.*

TRIBE 5. *Ardisiææ*.—Corolla monopetalous. Stamens all fertile; anthers turned inwards. Ovary free. Fruit many-seeded.

GENERA AND SYNONYMES.

Oncostemum, *A.Juss*
Amblyanthus, *A.DC*
Hymenandra, *A.DC*
Antistrophe, *A.DC.*
Myrsine, *L.*
Rapanea, *Aub.*
Ræmeria, *Th.*
Plotia, *Ad.*
Scleroxylon, *W.*
Manglilla, *A.Juss*
Caballeria, *R.&P.*
Samara, *Sw.*

Suttonia, *A.Rich.*
Athrrophyllum,
[Lour.
Hosta, *Fl. Fl.*
Peckia, *Fl. Fl.*
Zacyntia, *Fl. Fl.*
Pleiomeris, *A. DC.*
Heberdenia, *Banks.*
Pimelandra, *A.DC.*
Labisia, *Lindl.*
Badula, *Juss.*
Barthesia, *Com.*

Cephalogyno,
[A. DC.
Isostylis, *A. DC.*
Acephale, *A. DC.*
Hemigynce, *A.DC*
Astrophe, *A. DC.*
Stylogynce, *A. DC.*
Monoporus, *A. DC.*
Conomorpha, *A.DC*
Conostylus, *Pohl.*
Weigletia, *A. DC.*
Grammadenia *Benth*

Cybianthus, *Mart.*
Wallenia, *Seb.*
Petesioides, *Jacq.*
Icacorea, *Aubl.*
Ardisia, *Sw.*
Anguillaria, *Gärt*
Bladhia, *Th.*
Pyrgus, *Lour.*
Micranthera, *A.*
[DC.
Tyrbæa, *A.DC.*
Pickeringia *ADC*
? Purkingia, *Presl.*

GEOGRAPHICAL DISTRIBUTION.—They inhabit the tropical and sub-tropical regions of Asia and America. At the Cape of Good Hope, in Australia, Japan, and the Canary Islands, they are rare; and none have as yet been found north of the tropics in Africa.

PROPERTIES AND USES.—They have more or less a disposition to produce a resinous substance, which appears as dots in different parts of the plants, chiefly on the leaves, flowers, and berries. The flowers of many are fragrant. The leaves and young branches of some of the *Jacquinias* are used in Brazil for stupefying fish in rivers and ponds, and the fruit is poisonous. With the ground seeds of *Theophrasta Jussieui*, called in St. Domingo *Le petit Coco*, bread is made. The fruit of *Clavija* is agreeable to eat, but the root is emetic. *Embelia ribes* grows abundantly in Silhet; and the natives gather the berries and dry them, for sale to small traders in black pepper, which they fraudulently mix with them, and which they so much resemble as to render it almost impossible to distinguish them by sight, or by any other means, as they possess a considerable degree of the spice flavour. The berries of *E. robusta* are considered cathartic. The bark of *Cybianthes detergens* is both gummy and astringent, and is used in baths as a lotion, by the Brazilians, against scurfiness on the skin. The seeds of *Wallenia laurifolia* are peppery. The leaves of *Myrsine melanophleas*, a native of the Cape of Good Hope, are astringent. The fruit of *Reptonia buxifolia*, called *Goorgoora*, is sold in the bazaars of Cabul, and is considered heating by the Affghans; it is roundish, succulent, and about the size of a marble.

ORDER CXXV.—SALVADORACEÆ—SALVADORA FAMILY.

THIS is a small family allied to Myrsinacæ through Ardisiæ, and also to Oleacæ. They are small trees or shrubs, with opposite leaves and minute paniced flowers. Calyx with four sepals. Corolla four-cleft. Stamens four. Ovary superior. Fruit a berry, one-celled. Seed solitary, erect, without albumen.

GENERA AND SYNONYMES.

Salvadora, *L.*
 Monctia, *Herit.*
 Azima, *Lam.*

Actegeton, *Bl.*
 Dobera, *Juss.*
 Tomex, *Forsk.*

Schizocalyx, *Hochst.*
 Bouea, *Meisn.*
 Cambessedea, *Wight.*

They inhabit India, Syria, and northern Africa. *Salvadora persica* is supposed by Dr. Royle to be the *Mustard Tree* of Scripture; but I have been told by the late Mr. Barker, who resided the greater part of his life in Syria, and also by Dr. Keith, who has travelled so much in that country, that there the common mustard plant attains the dimensions of a small tree, and that they believe it is the plant referred to by our Saviour. The bark of the root is very aerid, and, if applied to the skin, soon raises blisters.



ORDER CXXVI.—JASMINACEÆ.—JASMINES.

SHRUBS either erect or climbing. *Leaves* opposite or alternate, often trifoliate or unequally pinnate, rarely simple; without leaflets at the base. *Flowers* hermaphrodite, regular, in corymbs or panicles, frequently sweet-scented. *Calyx* permanent, with five or eight lobes. *Corolla* hypogynous, with five to eight lobes, the margins of which overlap each other, and with a twisted or valvate æstivation. *Stamens* two, united to and included in the tube of the corolla. *Ovary* without a hypogynous disk, two-celled, and with a two-lobed apex; ovules erect; cells one to two, rarely two to four-ovuled. *Style* simple; *stigma* two-lobed. *Fruit* either a double berry or a bipartite capsule. *Seeds* with very little or no albumen. *Embryo* straight; radicle inferior.

Fig. 15). *Jasminum fruticans*.

GENERA AND SYNONYMES.

Chondrospermum,	Parilium, Gärt.
[Wall.	Bolivaria, Ch. & Sch.
Jasminum, T.	Calyptrerospermum, c
Mogorium, Juss.	[Dietr.
Nyctanthes, Lour.	Menodora, H. & B.
Nyctanthes, Juss.	Schrebera, Th.
Scabrita, L.	? Balangue, Gärt.

GEOGRAPHICAL DISTRIBUTION.—They are chiefly found in the tropics of Asia. A few are met with in the islands of Africa, in Australia, and South America; and two extend to southern Europe.

PROPERTIES AND USES.—The flowers abound in a fragrant essential oil. The genuine *Oil of Jasmine* is generally obtained from the *Common White Jasmine* (*Jasminum officinale*) and *J. grandiflorum*, but it is also procured from *J. sambac*. The method of extracting it will be found at page 289. The flowers do not yield their aroma by distillation. A mixture of the powdered roots of *J. angustifolium* and *Accrus calamus* is considered, in India valuable against ringworm. According to Richard, the leaves of *J. floribundum* are very bitter, and have a powerful action against tape-worm, for which purpose they are used in Abyssinia. The flowers of *Nyctanthes arbor-tristis* have a most exquisite fragrance, which they yield only during the night, and in the morning the ground is strewn with the fleeting flowers. The flowers dye a beautiful yellow.

ORDER CXXVII.—ASCLEPIACEÆ.—MILKWEEDS.

HERBS or shrubs, with a milky juice, and frequently with a twining



Fig. 151. *Dictyanthus campanulatus*.

growth. *Leaves* opposite, rarely in whorls, sometimes alternate by abortion or dissociation, furnished with hairs between the footstalks. *Flowers* hermaphrodite, regular. *Calyx* five-parted, permanent. *Corolla* campanulate or rotate, with a valvate or twisted æstivation, furnished with petal-like appendages in its throat, which are of various forms, some like a horn, or a helmet, or simply hairs, but seldom naked. *Stamens* five, inserted in the base of the corolla alternate with its lobes, and united into a tube, which closely girds the ovary; *anthers* two-lobed, terminated by a membranous appendage enclosing the pollen, which is collected in masses, and these are suspended to fine, small, black, shining glands placed round the stigma alternate with the anthers. *Ovary* composed of two carpels, either distinct or close together when young. *Stigmas* terminated by a thick, five-angled mass, the angles of which alternate with the anthers. *Fruit* composed of two many-seeded follicles, membranous or slightly fleshy. *Seeds* numerous, imbricate,

pendulous, usually furnished with a tuft of hairs at the hilum. *Embryo* straight, in the centre of thin fleshy or horny albumen, with leafy seed-lobes and a superior radicle.

TRIBE 1. *Periploceæ*.—Filaments partially or entirely distinct; anthers one to four-celled, frequently bearded on the back. Pollen-masses five to twenty-granuled, adhering to the dilated tops of the glandular bodies of the stigma either singly or in fours.

GENERA AND SYNONYMS.

<i>Cryptostegia</i> , R.Br.	<i>Tacazzea</i> , Dcne.	<i>Gymnanthera</i> , R.Br.	<i>Finlaysonia</i> , Wall.
<i>Zucchellia</i> , Dcne.	<i>Æchmolepis</i> , Dcne.	<i>Camptocarpus</i> , Dcn.	<i>Hemedesmus</i> , R.Br.

Brachylepis, <i>W. & A.</i>	Phyllanthera, <i>Bl.</i>	Campelepis, <i>Falc.</i>	Pentanura, <i>Bl.</i>
Decalepis, <i>W. & A.</i>	Lepistoma, <i>Bl.</i>	Myriopterion, <i>Griff.</i>	Atherostemon, <i>Bl.</i>
Streptocaulon, <i>W. & A.</i>	Leposma, <i>Bl.</i>	Pentopetia, <i>Denc.</i>	Dicerolepis, <i>Bl.</i>
Harpanema, <i>Denc.</i>	Periploca, <i>L.</i>	Ectadium, <i>E. Mey.</i>	Cryptolepis, <i>R. Br.</i>
Atherandra, <i>Denc.</i>			

TRIBE 2. *Secamoneæ*.—Filaments connate. Anthers four-celled, smooth. Pollen-masses twenty, smooth, attached in fours to the apex of the stigmatic glands.

GENERA.

Secamone, *R. Br.* | *Goniostemma*, *Wight.* | *Toxocarpus*, *W. & A.*

TRIBE 3. *Asclepieæ*.—Filaments connate. Anthers two-celled. Pollen-masses ten, attached in pairs to the stigmatic glands by a bipartite, longitudinal furrow.

DIV. 1. *Astephanæ*.—Throat of the corolla scaleless. Staminal crown wanting.

GENERA.

Mitostigma, *Denc.* | *Hæmax*, *E. Mey.* | *Nautonia*, *Denc.*
Astephanus, *R. Br.* | *Hemipogon*, *Dcaisne.* |

DIV. 2. *Microlomæ*.—Throat of the corolla furnished with fleshy scales. Staminal crown wanting.

GENERA.

Steinheillia, *Denc.*
Microloma, *R. Br.*

DIV. 3. *Haplostemmæ*.—Staminal crown simple, with five leaflets; leaflets simple, inserted in the base of the column of fructification (gynostegium), entire or more or less two-cleft above.

GENERA AND SYNONYMES.

<i>Metaplexis</i> , <i>R. Br.</i>	<i>Euslenia</i> , <i>Nutt.</i>	<i>Podostigma</i> , <i>Ell.</i>	<i>Haplostemma</i> ,
<i>Parapodium</i> , <i>E. Mey.</i>	<i>Ampelanus</i> , <i>Raf.</i>	<i>Stylandra</i> , <i>Nutt.</i>	[<i>Endl.</i>
<i>Barjonia</i> , <i>Denc.</i>	<i>Cordylogyne</i> , <i>E. Mey.</i>	<i>Acerates</i> , <i>Ell.</i>	<i>Pentagonium</i> ,
<i>Pyenostelma</i> , <i>Bnge.</i>	<i>Xysmalobium</i> , <i>R. Br.</i>	<i>Anantherix</i> , <i>Nutt.</i>	[<i>Schauer.</i>
<i>Metastelma</i> , <i>R. Br.</i>	<i>Periglossum</i> , <i>Denc.</i>	<i>Polyothus</i> , <i>Nutt.</i>	<i>Oncinema</i> , <i>Arn.</i>
<i>Raphistemma</i> , <i>Wall.</i>	<i>Glossostephanus</i> , <i>E.</i>	<i>Vinectoxicum</i> , <i>Mön.</i>	<i>Odontanthera</i> , <i>Wt.</i>
<i>Roulinia</i> , <i>Denc.</i>	[<i>Mey.</i>	<i>Blyttia</i> , <i>Arn.</i>	

DIV. 4. *Cynoctonæ*.—Throat of the corolla naked. Staminal crown simple, cup-shaped, or tubular, nearly entire or lobed.

GENERA AND SYNONYMES.

<i>Orthosia</i> , <i>Denc.</i>	<i>Pyenoneurum</i> , <i>Dcn.</i>	<i>Argelia</i> , <i>Denc.</i>	<i>Physianthus</i> , <i>M.</i>
<i>Cynoctonum</i> , <i>E. M.</i>	<i>Holostemma</i> , <i>R. Br.</i>	<i>Arauja</i> , <i>Brot.</i>	[<i>§ Z.</i>
<i>Bunburia</i> , <i>Harv.</i>	<i>Solenostemma</i> , <i>Hayn.</i>		<i>Schubertia</i> , <i>M. & Z.</i>

DIV. 5. *Sarcostemmæ*.—Throat of the corolla naked. Staminal crown generally double; the exterior sinuato-lobed, short; the interior of five leaflets, which are fleshy or strap-shaped, or more or less swollen.

GENERA.

Calotropis, <i>R. Br.</i>	Kinahia, <i>R. Br.</i>	Sarcostemma, <i>R. Br.</i>	Damia, <i>R. Br.</i>
Pentratropis, <i>R. Br.</i>	Eutropis, <i>Falc.</i>	Oxystelma, <i>R. Br.</i>	

DIV. 6. *Eustigiæ*.—Throat of the corolla naked. Staminal crown bell-shaped, double or triple, lower leaflets more or less united, opposite or alternate, terminating in a linear appendage, girding the sessile or stipitate (gynostegium).

GENERA.

Fockea, <i>Endl.</i>	Peplonia, <i>Dcne.</i>	Endotropis, <i>Endl.</i>	Mastostigma, <i>Stks.</i>
Eustegia, <i>R. Br.</i>	Decanema, <i>Dcne.</i>	Cynanchum, <i>R. Br.</i>	

DIV. 7. *Asclepiadæ*.—Throat of the corolla naked. Staminal crown five-leaved; leaflets more or less concave or hooded, inserted in the base, or rarely in the summit of the column of fructification (gynostegium).

GENERA AND SYNONYMES.

Pentarrhinum, <i>E. M.</i>	Conomitra, <i>Fenzl.</i>	Rhinolobium, <i>Arn.</i>	Asclepias, <i>Juss.</i>
Schizoglossum, <i>E. M.</i>	Aspidoglossum, <i>E. M.</i>	Gomphocarpus, <i>R.</i>	Apocynum, <i>T.</i>
Glossonema, <i>Dcn.</i>	Lagarinthus, <i>E. M.</i>	[<i>Br.</i>]	

DIV. 8. *Ditissæ*.—Staminal crown composite; leaflets in two opposite series.

GENERA.

Ditissa, <i>R. Br.</i>
Tassadia, <i>Decaisne.</i>

DIV. 9. *Oxypetalæ*.—Staminal crown adnate with the tube of the corolla, tubular or five-leaved; leaflets simple or toothed. Pollen-masses fixed to a broad jointed process. Stigmatic gland linear. Stigma elongated, with a wide apex, truncate or open, two to seven-cleft above.

GENERA AND SYNONYMES.

Calostigma, <i>Dcne.</i>	Schistogyne, <i>H. & A.</i>	Sonninia, <i>Reichb.</i>	Rhysostelma, <i>Dcn.</i>
Oxypetalum, <i>R. Br.</i>	Melinia, <i>Dcne.</i>	Morrenia, <i>Lindl.</i>	Scutera, <i>Reichb.</i>
Gothofreda, <i>Vent.</i>	Brachylepis, <i>H. & A.</i>	Turrigera, <i>Dcne.</i>	Lyonia, <i>Ell.</i>

TRIBE 4. *Gonolobæ*.—Filaments connate. Anthers two-celled, opening transversely. Pollen-masses ten, attached in pairs to the stigmatic glands, divided in two by a longitudinal furrow, horizontal, generally pellucid at the apex, hidden under the depressed, five-sided, star-like stigma.

GENERA AND SYNONYMES.

Matelea, <i>Aubl.</i>	Macroseepis, <i>H. B. K.</i>	Pherotrichis, <i>Dcn.</i>	Nephradenia, <i>Dcne.</i>
Hostea, <i>W.</i>	Fischeria, <i>DC.</i>	Polystemma, <i>Dcne.</i>	Dictyanthus, <i>Dcne.</i>
Gonolobus, <i>Mx.</i>	Lachnostoma, <i>HBK.</i>	Blepharodon, <i>Dcne.</i>	Chthamalia, <i>Dcne.</i>
Ibatia, <i>Decaisne.</i>			

TRIBE 5. *Stapelieæ*.—Filaments connate. Anthers generally terminated by a membrane. Pollen-masses ten, attached in pairs to the stigmatic

glands, ascending or erect, opaque on both sides, not unfrequently pellucid above or at the sides, and as if covered over.

DIV. 1. Pergulariæ.—Pollen-masses opaque on both sides.

GENERA AND SYNONYME.

<i>Ptyeanthra</i> , <i>Denc.</i>	<i>Hybanthera</i> , <i>Endl.</i>	<i>Pervillaea</i> , <i>Denc.</i>	<i>Dregea</i> , <i>E. Mey.</i>
<i>Tenaris</i> , <i>E. Mey.</i>	<i>Asterostemma</i> , <i>Decu.</i>	<i>Marsdenia</i> , <i>R. Br.</i>	<i>Pergularia</i> , <i>R. Br.</i>
<i>Tylophora</i> , <i>R. Br.</i>	<i>Cosmostigma</i> , <i>Wt.</i>	<i>Sieyoearpus</i> , <i>Boj.</i>	<i>Stephanotis</i> <i>Thouars</i>

DIV. 2. Gymnemæ.—Stamineal crown wanting. Tube of the corolla generally hairy on the inside; throat naked or rarely furnished with five scales under the sinus.

GENERA.

<i>Gymnema</i> , <i>R. Br.</i>	<i>Gongronema</i> , <i>Endl.</i>	<i>Trichosandra</i> , <i>Denc.</i>
<i>Bidaria</i> , <i>Endl.</i>	<i>Sarcelobus</i> , <i>R. Br.</i>	<i>Rhyssolobium</i> , <i>E. Mey.</i>

DIV. 3. Ceropegiæ.—Pollen-masses pellucid at the apex or on the sides.

GENERA AND SYNONYMS.

<i>Orthanthera</i> , <i>Wight</i>	<i>Pterygoearpus</i> ,	<i>Boucerosia</i> , <i>Wight.</i>	<i>Trichosacme</i> , <i>Zucc.</i>
<i>Macropetalum</i> <i>Brch</i>	[<i>Hochst.</i>	<i>Desmidorehis</i> ,	<i>Leichhardtia</i> , <i>R. Br.</i>
<i>Pentasaeme</i> , <i>W. all.</i>	<i>Cystidianthus</i> , <i>Bl.</i>	[<i>Ehrb.</i>	<i>Hoodia</i> , <i>Sweet.</i>
<i>Leptadenia</i> , <i>R. Br.</i>	<i>Acanthostemma</i> , <i>Bl.</i>	<i>Hutelinia</i> , <i>Wt.</i>	<i>Monothylacium</i> ,
<i>Barrowia</i> , <i>Denc.</i>	<i>Otostemma</i> , <i>Bl.</i>	<i>Sisyranthus</i> , <i>E. M.</i>	[<i>Don.</i>
<i>Heterostemma</i> , <i>W.</i>	<i>Cathetostemma</i> , <i>Bl.</i>	<i>Apteranthes</i> , <i>Mik.</i>	<i>Seytanthus</i> , <i>Hook</i>
[<i>S. A.</i>	<i>Plocostemma</i> , <i>Bl.</i>	<i>Piarranthus</i> , <i>R. Br.</i>	<i>Baxtera</i> , <i>Reichb.</i>
<i>Conehophyllum</i> , <i>Bl.</i>	<i>Rioereuxia</i> , <i>Denc.</i>	<i>Huernia</i> , <i>R. Br.</i>	<i>Harrisonia</i> , <i>Hook.</i>
<i>Dischidia</i> , <i>R. Br.</i>	<i>Ceropegia</i> , <i>L.</i>	<i>Stapelia</i> , <i>L.</i>	<i>Apoxynanthera</i> ,
<i>Pterostelma</i> , <i>Wight</i>	<i>Anisotoma</i> , <i>Fenzl.</i>	<i>Curroia</i> , <i>Planch.</i>	[<i>Hochst.</i>
<i>Centrostemma</i> , <i>Den</i>	<i>Eriopetalum</i> <i>Wight</i>	<i>Jasminanthes</i> , <i>Bl.</i>	<i>Raphionacme</i> ,
<i>Hoya</i> , <i>R. Br.</i>	<i>Brachystelma</i> , <i>R. Br.</i>	<i>Belostemma</i> , <i>Wall.</i>	[<i>Hav.</i>
<i>Sperlingia</i> , <i>Vahl.</i>	<i>Caralluma</i> , <i>R. Br.</i>		

GEOGRAPHICAL DISTRIBUTION.—These are most abundant in tropical and sub-tropical regions north of the equator, in the New World; but in the Old World they are most frequent in the south. A great many are found at the Cape of Good Hope.

PROPERTIES AND USES.—The virtues of this family reside in a bitter, acrid, milky, juice, with extractive substances which act as emetics. Many are used as a substitute for *Ipeacuanha*, a few as purgatives and anthelmintics, and some are possessed of stimulating properties. Several of those natives of India, furnish an abundance of strong and useful fibre.

Hemidesmus indicus is called *Indian Sarsaparilla*. It is a climbing shrub, and grows plentifully all over India. The root has a peculiar aromatic odour and bitter taste, and is used in India as a substitute for sarsaparilla. It contains a peculiar volatilisable principle with acid properties, which has been called *Smilasperic acid*, under the supposition that the root from which it was taken was that of *Smilax aspera*; but, seeing it is from a very different source, *Parcira* proposed the name of *hemidesmic acid*. Dr. O'Shaughnessy speaks in high terms of its medical action; as a diuretic, its operation is very remarkable; it is an excellent diaphoretic and tonic, and

wonderfully increases the appetite. *Periploca aphyllum* furnishes a fibre which is much used in Scinde for making into ropes and bands, used for wheels, as water does not rot them. The juice of *P. græca* is so acrid, that it is used in the East for poisoning wolves. *Secamone emetica* is a native of India, and its roots are acrid and emetic, and frequently used in native practice as a substitute for ipecacuanha; and those of *S. Alpini* are a drastic purgative. *Vincetoxicum officinale*, or *Swallow-wort*, grows plentifully in many parts of Europe. It is a small, herbaceous plant, and its root had formerly the reputation of being a counter-poison. It has, when fresh, a nauseous odour and an acrid taste, which it loses by drying. It excites vomiting if taken externally; and is said to be useful in cutaneous diseases, as scrofula, but it is little employed. On analysis, Feneuille found the root to contain resin, mucilage, starch, jelly, fixed oil, malates of potash and lime, and an emetic extract differing from emetine. *Holostemma Rheedianum*, which grows abundantly in western India, produces a very strong fibre. The leaves of *Solenostemma argel*, a native of Syria, are purgative, and they are used in Egypt for adulterating senna, to which they communicate irritating properties. *Calotropis gigantea* furnishes the *Madar*, or *Mudar*, of India. It is a large shrub, common in India, and the root, bark, and inspissated juice are used extensively for their emetic, diaphoretic, alterative, and purgative properties, which have been known for many centuries to the Indian practitioners, and which have also attracted the attention of European physicians. Its milky juice has been collected, says Dr. Royle, by making incisions in the plant, and prepared as a substitute for caoutchouc and gutta percha. Ten average-sized plants will yield as much juice as makes a pound of gutta-percha-like substance. The natives of Madras use the silky down of the pods in making a soft, cotton-like thread. The plant yields a strong and useful fibre, which makes excellent cordage and fishing-nets. The juice of *C. procera* is extremely acrid, and is used to remove hair from the skin, and as an external remedy in ringworm and several other cutaneous diseases. A kind of manna, called Shukr-ul-ashur, is produced on this by the puncture of an insect called in India gultigul. *Sarcostemma glaucum* is used in Venezuela as ipecacuanha. *Oxystelma esculenta* is a common plant in India, and is used by the natives, in decoction, as a gargle in aphthous ulcerations of the mouth, and in sore throat; cattle eat the roots. The juice of *Cynanchum monspeliacum*, a native of the south of France and Italy, furnishes the drug called *Montpellier Scammony*, which is the concrete juice of the plant. It acts as a violent purgative, but is little used. *C. ovulifolium*, a native of Penang, yields excellent caoutchouc. The root of *Gomphocarpus pedunculatus*, when peeled, is eaten in Abyssinia under the name of *entellect*.

Asclepias syriaca is found abundantly in Syria, and is cultivated in some parts of Europe. The silk-down which surmounts the seed is not more than an inch or two in length, but has nevertheless been usefully applied for articles of dress manufactured with it both in France and Russia. The fibres of the stem, prepared in the same manner as those of hemp and flax, furnish a very long fine thread, of a glossy whiteness. The nectaries or leaflets of the corona of this plant act as fly-traps. It is very common in the United States, where it is called *Silk-weed*, from its silky down, which is used for making hats, and for stuffing beds and pillows.

The plant is there used medicinally, for the anodyne properties its root possesses. It has been employed successfully, both in powder and infusion, in cases of asthma and typhus fever attended with catarrh, in both cases producing expectoration, and relieving cough and pain. It has also been used in scrofula with great success. The juice has a faint smell, a subacid taste, and an acid reaction. In eighty parts it contains sixty-nine of water, 3.5 of wax-like, fatty matter, 5 of caoutchouc, 0.5 of gum, 1 of sugar, with salts of acetic acid, and 1 of other salts. It contains a curious crystalline substance, of a resinous character, closely allied to lactone, and called *asclepione*. *A. tuberosa*, a native of the United States, is called *Butterfly-weed*, or *Pleurisy-root*. The root is extensively used in the southern states in catarrh, pneumonic pleurisy, consumption, and other chest affections. It has also been used with great advantage in diarrhoea, dysentery, and acute and chronic rheumatism. Bigelow regards it as a mild tonic and stimulant. *A. curassavica* is called in the West Indies *Bastard Ipecacuanha*. The juice made into a syrup, is said to be a powerful anthelmintic, and as such is given to children in the West Indies. The plant is used by the negroes as an emetic, and the root is purgative. *A. debilis*, a native of the United States, produces from its stems a fibre resembling flax, much superior to that obtained from any other of the species, being of a beautiful silky gloss and extreme strength. With the juice of *Gonolobus macrophyllus* the North American Indians poison their arrows. The dried roots of *Tylophera asthmatica*, a native of India, if given in rather large doses, is as efficacious as ipecacuanha. *Marsdenia tenacissima* produces a very strong fibre, with which the Rajmahal mountaineers of India make bow-strings so durable as to last for five years, though in constant use, and exposed to all sorts of weather. The milky juice which exudes from the plant forms a kind of caoutchouc, acting in the same way by removing black-lead marks. *Orphanthera viminea*, *Leptadenia spartea*, and *L. Jacquemontiana* also yield excellent fibre in common use by the natives of India. *Hoya viridiflora* also furnishes a long and strong fibre. Its root and young shoots are used as alteratives. The leaves with oil form a popular cataplasm, applied by the natives to boils in all stages. Burmann says the juice of *Gymnema lactifera*, a native of Ceylon, is used as a substitute for cow's milk when that is scarce, and the leaves are boiled with food.



ORDER CXXVIII.—APOCYNACEÆ.—DOGBANES.

TREES or shrubs, usually with an acrid, milky juice. *Leaves* opposite



Fig. 152. *Tabernamontana longiflora*.

or in threes, very rarely alternate, generally furnished with hairs or glands between the footstalks. *Flowers* hermaphrodite, regular. *Calyx* five-cleft, permanent, frequently glandular at the base, or scaly with connate glands. *Corolla* with five lobes, twisted in æstivation. *Stamens* five, alternating with the lobes of the corolla; *anthers* often furnished with appendages, leathery, connivent under the stigma; two-celled, bursting lengthwise; pollen granular. *Ovary* composed of two generally distinct, many-ovuled carpels; *style* single or double, terminated by a thick, sometimes two-lobed stigma. *Fruit* composed of two many-seeded follicles, sometimes a double drupe or berry, one or many-seeded. *Seeds* with fleshy or cartilaginous albumen, usually pendulous, occasionally without albumen. *Embryo* with leafy seed-lobes, an inconspicuous plumule, and a radicle turned towards the hilum.

TRIBE 1. Willoughbeia. — Ovary single, one-celled, with two marginal seed-bearers (parietal placentæ). Calyx not glandular. Ovules amphitropal. Seeds naked.

GENERA AND SYNONYMES.

Allamanda, L.	Chilocarpus, Bl.	„ Bentheca, Neck.	Couma, Aubl.
Galarips, Alla.	Landolphia, Palis.	Ancylocladus,	? Collophora, Mart.
Orelia, Aubl.	Willughbeia, Roxb.	[Wall.]	? Pacouria, Aubl.

TRIBE 2. Carisseæ. — Ovary single, two-celled, from two ovaries being more or less united; ovules attached to the partition, amphitropal. Seeds naked. Fruit frequently baccate or drupaceous. Calyx frequently without glands.

GENERA AND SYNONYMES.

Craspidospermum,	Faterna, <i>Noronh.</i>	Clitandra, <i>Benth.</i>	Ranwolfia, <i>Pl.</i>
[<i>Boj.</i>	Ambelania, <i>Aub.</i>	Carissa, <i>L.</i>	Neuburgia, <i>Bl.</i>
? Plectancia,	Carpodinus, <i>R. Br.</i>	Arduinia, <i>L.</i>	Pseudochrosia, <i>Bl.</i>
[<i>Thouars.</i>	Melodinus, <i>Forst.</i>	Antura, <i>Forst.</i>	Ophoxylon, <i>L.</i>
Maycockia, <i>A. DC.</i>	Oncinus, <i>Lour.</i>	? Toxicophilœa <i>Hav</i>	Tsiovanna, <i>Rheed</i>
Hancornia, <i>Gom.</i>	Bicorona, <i>A. DC.</i>	Cestrum, <i>Th.</i>	Thevetia, <i>L.</i>
Winchia, <i>A. DC.</i>	Leuconotis, <i>Jack.</i>	Chaetosus, <i>Benth.</i>	Ahouai, <i>Pl.</i>
Vahca, <i>Lam.</i>			

TRIBE 3. *Plumeriææ*.—Ovaries two, distinct, with the ovules on the internal angle; ovules amphitropal. Seeds naked. Fruit either a berry, a drupe, or a somewhat fleshy follicle.

GENERA AND SYNONYMES.

Alyxia, <i>R. Br.</i>	Piptolœna, <i>Harv.</i>	Tabernæmontana,	Catharanthus <i>GD</i>
Gynopogon <i>Forst</i>	Voacanga, <i>E.M.</i>	[<i>Pl.</i>	Amsonia, <i>Wall.</i>
Vallesia, <i>R. & P.</i>	Orchippeda, <i>Bl.</i>	Pandaca, <i>Thours.</i>	Rhazya, <i>Decaisne.</i>
Hunteria, <i>Roxb.</i>	Urecola, <i>Roxb.</i>	Rejoun, <i>Gaud.</i>	Thyrsanthus, <i>Benth</i>
Kopsia, <i>Bl.</i>	Vahca, <i>Poir.</i>	Reichardia, <i>Denn</i>	Gonioma, <i>E. Mey.</i>
Calpicarpum, <i>GD</i>	Bonafousia, <i>A. DC.</i>	? Conopharingia,	Cameraria, <i>Pl.</i>
Cerbera, <i>L.</i>	Stemmadenia, <i>Benth</i>	[<i>G. D.</i>	Plumeria, <i>T.</i>
Manghas, <i>Burm.</i>	Odontadenia, <i>Benth</i>	Maluetia, <i>A. DC.</i>	Plumiera, <i>R. & P.</i>
Odollam, <i>Rheed.</i>	Peschiera, <i>A. DC.</i>	Condylocarpon <i>Desf</i>	Anisobolus, <i>A. DC.</i>
Tanghinia, <i>Thouars</i>	Lepinia, <i>Decne.</i>	Vinea, <i>L.</i>	Aspidosperma, <i>M&Z</i>
Ochrosia, <i>Juss.</i>	Hostmannia, <i>Miq.</i>	Pervinea, <i>T.</i>	Macaglia, <i>Vahl.</i>
? Voacanga <i>Thouars</i>	Roupellia, <i>Will.</i>	Lochnera, <i>Rehb.</i>	

TRIBE 4. *Parsoniææ*.—Ovary single, one-celled. Seeds with a tuft of hair at the top.

GENERA AND SYNONYMES.

Vallaris, <i>Burm.</i>	Lyonsia, <i>R. Br.</i>	Balfouria, <i>R. Br.</i>
Emericia, <i>R. & G.</i>	Parsonia, <i>R. Br.</i>	Beaumontia, <i>Wall.</i>
Peltanthera, <i>Roth</i>		

TRIBE 5.—*Wrightiææ*.—Ovaries double, distinct. Follicles two. Seed with a tuft of hair below. Seed-lobes convolute.

GENERA AND SYNONYMES.

Wrightia, <i>R. Br.</i>	„ Hasseltia, <i>Bl.</i>	Gelsemium, <i>Juss.</i>
Kixia, <i>Bl.</i>	Kibatatia, <i>G. D.</i>	Gelseminum, <i>Catesb.</i>

TRIBE 6. *Alstoniææ*.—Ovaries double, distinct; ovules amphitropal. Follicles two. Seeds hairy on both sides.

GENERA AND SYNONYME.

Alstonia, <i>R. Br.</i>	Blaberopus, <i>A. DC.</i>
Pala, <i>Juss.</i>	Adenium, <i>R. & S.</i>

TRIBE 7. *Echiteææ*.—Ovaries double, distinct. Ovules amphitropal or almost anatropal. Follicles two. Seeds with a tuft of hair at the top.

GENRA AND SYNONYMS.

Haplophyton, [A. DC.	Belonites, E. M.	Aganosma, G. Don.	Secondatia, A. DC.
Holarrhena, R. Br.	Baissea, A. DC.	Ichnocarpus, R. Br.	Echites, P. Br.
? Alafia, Thours.	? Heligme, Bl.	Forsteronia, Mey.	Mandevilla, Lind
Isonema, R. Br.	Helygia, Bl.	Apocynum, T.	Exothostemon,
? Echaltium, Wight.	Thenardia, Kuth.	Pottisia, Hook & Arn.	[G. Don
? Christya, Ward.	Hæmadietyon,	Parsonia, Wall.	Oncinotis, Benth.
Strophanthus, DC.	[Lindl.	Ecdysanthera,	Laseguea, A. DC.
Nerium, L	Prestonia, R. Br.	[H. & A.	Dipladenia, A. DC
Nerianda, A. DC.	Chonemorpha, G.D	Anodendron, A. DC	Laubertia, A. DC.
Motandra, A. DC.	Rhycospermum,	Chavannesia,	Mascarenhasia,
Pachypodium,	[A. DC.	[A. DC.	[A. DC.
[Lindl.	? Cercocoma, Wall.	Robbia, A. DC.	

DOUBTFUL GENERA.

Skytanthus, Meyen.	Schistocodon, Schau	Syringosma, M. & Z.	Dissolena, Lour.
Tayotum, Blanco.	Pycnostelma, Bnge.	Cryptolobus, Wall.	Systrephia, Thours.

GEOGRAPHICAL DISTRIBUTION.—The great mass of this family grow naturally in the tropics; they are rarely found in temperate or subtropical regions, and in our latitude they are very rare. They are most abundant in the warmer parts of Asia; a considerable number inhabit the tropics of America. The Periwinkle is the representative of the family in our climate.

PROPERTIES AND USES.—The acrid milky juice which abounds in the greater part of the family is possessed of very energetic and deleterious properties; and although the herbaceous part and the fruit of some of the individuals may be reported eatable, they should be used with caution, as the action of the whole family is either acrid, purgative, or very poisonous. Some are nevertheless used medicinally. Others contain a large quantity of caoutchouc. The bark of many abounds in a bitter, astringent substance, and some contain colouring matter. The seeds of several are very poisonous, and others contain a quantity of oil, and are quite innocuous.

An infusion of the leaves of *Allamanda cathartica*, a native of South America, is a valuable cathartic, used especially in painters' cholic. In too large doses, it is violently emetic and drastic. The fruit of *Willoughbeia edulis* is pulpy, soft, and eatable, and is much esteemed by the natives of Chittagong and Silhet. The milky, viscid juice, which flows from every part of the plant, becomes, on drying, an inferior kind of caoutchouc. In South America, the natives eat the berries of *Counna*, *Pacouria*, and *Ambe-lania*. *Collophora utilis* yields caoutchouc in South America. The wood of *Hancornia* is bitter, and the fruit is sweet, sub-acid, and vinous. The fruit of *Carpodinus dulcis* is called by the settlers of Sierra Leone *Sweet Pit-hamin*, and is eaten. *Carissa carandas* is extensively used in the East Indies for making strong fences, for which it is very applicable, by reason of its very strong thorns. The fruit, just before it is ripe, is used to make tarts and preserves of various kinds; also to pickle; and by must people considered superior, for these uses, to every other fruit in the country, not even the mango excepted. They are about the size of a small plum, are called *Carandas*, and are universally eaten by the natives when ripe, and are tolerably pleasant, even to a European taste. The juice of *Rauwolfias* is a powerful drastic purgative. The juice of the *Ophioxylms* is acrid and caustic. The root is a febrifuge, and used as an antidote to snake poison;

and that of *O. serpentium* is used by the Telinga physicians to promote delivery in tedious cases. The seeds of *Thevetia ahoval* are poisonous, and the bark and juice emetic and narcotic. The juice of *T. nerifolia* is dangerous, and its bark powerful and febrifuge. The wood of both has a heavy odour, and is used for stupefying fish.

The bark of *Olyxia stellata* is bitter and aromatic, with the odour of melilote, and abounds in soft, acrid, aromatic-resin, an essential oil, and a bitter extractive substance. The kernels of *Cerbera manghas* are said to be emetic and purgative. The leaves are used in Japan as an excellent substitute for senna. The milky sap is also said to be purgative. *Tanghinia venenifera* is a native of Madagascar, and the fruit is poisonous. It is with the fruit of this tree that the ordeal for sorcery is held. Persons of all ranks, who are suspected or accused, are compelled to drink of the juice; and it generally happens that those who belong to the lower classes die, and the nobility and upper classes survive. These then make a triumphal entry into the town, amid the shouting, dancing, and rejoicing of the multitude. The kernel of the fruit, though not larger than an almond, is sufficient to destroy twenty people. *Urceola elastica* yields everywhere of the finest quality in great abundance. *Tabernæmontana utilis* is a native of British Guiana, on the banks of the Demarara. It is called *Hya Hya*, and when the trunk is wounded, it pours forth a copious stream of white milk, perfectly innoxious, which is used by the natives as cows' milk; hence such trees are called *Cow Trees*. The fruit of *T. dichotoma*, a native of Ceylon, is, by a wonderful stretch of imagination, said to be the *Forbidden Fruit* with which our first parents were tempted. The leaves of the *Greater Periwinkle* (*Vinca major*) and of the *Lesser Periwinkle* (*V. minor*), the latter of which is a native of Britain, are bitter, slightly acrid, and astringent. They are feebly purgative and diaphoretic, and have a popular sort of reputation for diminishing and suspending the secretion of the milk either at birth or weaning. *V. pumila* is applied in India, as an external stimulant, in lumbago. *Cameraria latifolia* yields a great abundance of milky juice, and is called *Bastard Manchineel Tree*, from its resemblance in quality to that formidable tree. The *Plumerias* are used as drastic purgatives. The flowers of *P. rubra* are so sweet and beautiful, that the women of South America adorn themselves with them, and put them among linen, to scent it, as we do lavender.

Wrightia antidysenterica is a native of India, Ceylon, and other parts of the East. It is a shrub six to ten feet high, and its bark forms the drug known as *Conessi bark*, which is astringent and bitter, and which has been given with effect in chronic dysentery and other bowel complaints. The wood is white, of a fine grain, and is used for turning and for cabinet work. *W. tinctoria*, also a shrub of large dimensions, grows over a great extent of country in India, and from its leaves the finest indigo is obtained. Dr. Roxburgh considered it the best for cultivation of all the plants producing indigo, on account of being perennial, hardy, and luxuriant. The wood of *W. coccinia* is light and tough, and is used for making palanquins. *Rixia* (*Hasseltia*) *arborca*, is a native of Java, and is a dangerous poison. The milky juice, mixed with honey, is given as a drastic against the tapeworm, but is a most dangerous remedy, causing inflammation of the intestines. The wood of *Alstonia scholaris*, a native of India, is as bitter as gentian,

and possessed of the same virtues; and with it the wooden tablets are made on which the Malay children write in schools. It is not generally known that the beautiful *Oleander* or *Rose-bay* (*Nerium oleander*) we so much admire and cherish, is a deadly poison, and may frequently prove a treacherous fondling if not carefully watched. It is one of our most beautiful window-plants, when covered with its large, rose-like blossoms; but in these blossoms the weapon of death resides. Not long ago, a child, one morning, ate a few of those flowers, and in two days it died. During the Peninsular war, a number of French soldiers who went out foraging near Madrid, returned laden with the fruits of their search. One of the number, with the view of securing some wood to make skewers for the meat, cut a quantity of *Oleander* boughs, and having stripped them of the bark, used the wood in the meat. The result was, that out of twelve who ate of the roast, seven died, and the rest were dangerously ill. The poisonous principle is so subtle, that its exhalations alone are sufficient to cause serious accidents, and even death, to those who recline or sleep for any time under their influence. It exists equally in every part of the plant, but it is considerably weakened by cultivation. M. Orfila made many experiments with it, and has included it among the acrid narcotics. Oil in which the leaves are infused, has been used as a liniment in cutaneous disorders. According to Dr. Royle, *Ichnocarpus frutescens* is sometimes used in India as a substitute for Sarsaparilla. *N. picidium*, a native of the Silhet mountains of India, is equally poisonous. It contains a great quantity of fibre; and when Dr. Roxburgh put the young shoots into a fish-pond, to facilitate the removal of the bark and to clean the fibres, he found that many, if not all the fish, were killed.

Apocynum androsemaifolium, or *Dog's-bane*, a native of the United States, contains a great deal of milky juice, and the root is employed as an emetic; and in doses of ten or twenty grains, it has been used as a tonic. The Indians use it as a remedy in lues venerea. *A. cannabinum*, called *Indian Hemp*, is also a native of the United States. It is an herbaceous plant, growing two or three feet high, furnished with a strong fibre, used by the Indians for making fishing-nets, twine, bags, and other articles. Its root is five or six feet in length, and has a strong, nauseous odour, and a somewhat acrid, bitter taste. It yields a quantity of milky juice, which, when hardened, resembles caoutchouc. It contains a bitter principle, extractive, tannin, gallic acid, resin, wax, caoutchouc, fecula, lignin, and a peculiar principle, on which its activity depends, called *apocygnin*. The root is powerfully emetic and cathartic, sometimes diuretic, and, like other emetic substances, promotes expectoration. It has been found very useful in dropsy. From a species of *Echites* the Mandingoes are said to obtain a poison with which they smear their arrows. The whole genus is narcotic and acrid, and the roots of many are used as drastics. *Gelsemium nitidum*, a native of North America, is reckoned among the poisonous plants; it is an acrid narcotic.

ORDER CXXIX. LOGANIACEÆ.—STRYCHNIA FAMILY.

TREES, shrubs, or herbaceous plants. *Leaves* entire, opposite, with intermediate leaflets at their base, which are sometimes united in the form of a sheath. *Flowers* either solitary, or collected into a cluster or corymb, hermaphrodite, regular, or irregular. *Calyx* free, with four or five deep divisions, and either valvate or imbricate in æstivation. *Corolla* regular or irregular, with four, five, or ten lobes, convolute or valvate in æstivation. *Stamens* inserted in the corolla, sometimes alternate, and sometimes opposite to the lobes of the corolla. *Ovary* free, with two or three cells. *Style* bearing a simple stigma. *Fruit* sometimes dry and capsular, with two many-seeded cells, sometimes fleshy and drupaceous, containing one or two seeds. *Seeds* generally peltate, and sometimes winged, with a fleshy or horny albumen, containing a straight embryo, with the radicle turned towards the hilum.



Fig. 153. A, Flower of *Strychnos*, greatly magnified; B, vertical section of ovary; C, Transverse ditto of ditto.

TRIBE 1. *Spigeliæ*.—Corolla valvate in æstivation. Seeds not winged.

GENERA AND SYNONYMES.

<i>Spigelia</i> , <i>L.</i>	„ <i>Canala</i> , <i>Pohl.</i>	<i>Mitrcola</i> , <i>L.</i>	<i>Polypremum</i> , <i>L.</i>
<i>Arapabaca</i> , <i>Pl.</i>	<i>Cælostylis</i> , <i>T.&G.</i>	<i>Mitrasacme</i> , <i>Lab.</i>	

TRIBE 2. *Strychnæ*.—Corolla valvate in æstivation. Seeds winged.

GENERA AND SYNONYMES.

<i>Strychnos</i> , <i>L.</i>	<i>Ignatia</i> , <i>L.</i>	<i>Cyathospermum</i> ,	<i>Labordia</i> , <i>Gaud.</i>
<i>Rouhamon</i> , <i>Aubl.</i>	<i>Pagamea</i> , <i>Aubl.</i>	[<i>Wall.</i>	<i>Usteria</i> , <i>W.</i>
<i>Lasiostoma</i> , <i>Schröb.</i>	<i>Gardneria</i> , <i>Wall.</i>	<i>Norrisia</i> , <i>Gardn.</i>	<i>Monodynamis</i> ,
<i>Brehmia</i> , <i>Harr.</i>		<i>Antonia</i> , <i>Pohl.</i>	[<i>Gmel</i>

TRIBE 3. *Loganiæ*.—Corolla convolute in æstivation.

GENERA AND SYNONYMES.

<i>Lachnopylis</i> , <i>Hochst.</i>	<i>Hæmospermum</i> ,	<i>Cyrtophyllum</i> ,	<i>Sykesia</i> , <i>Arn.</i>
<i>Logania</i> , <i>R. Br.</i>	[<i>Bl.</i>	[<i>Reinw.</i>	<i>Potalia</i> , <i>Aubl.</i>
<i>Euosma</i> , <i>Andr.</i>	<i>Chaetosus</i> , <i>Benth.</i>	<i>Picrophyllæus</i> , <i>Bl.</i>	<i>Nicandra</i> , <i>Schröb.</i>
<i>Stomandra</i> , <i>R. Br.</i>	<i>Fagraea</i> , <i>Th.</i>	<i>Gærtnera</i> , <i>Lam.</i>	<i>Anthocleista</i> , <i>Afz.</i>
<i>Geniostoma</i> , <i>Forst.</i>	<i>Kuhlia</i> , <i>Reinw.</i>	<i>Andersonia</i> , <i>Schult.</i>	? <i>Codonanthus</i> , <i>G. D.</i>
<i>Anasser</i> , <i>Juss.</i>	<i>Kentia</i> , <i>Steud.</i>	<i>Frutesca</i> , <i>DC.</i>	? <i>Anabata</i> , <i>W.</i>
<i>Aspilotum</i> , <i>Banks</i>	<i>Utania</i> , <i>Don.</i>		

GEOGRAPHICAL DISTRIBUTION.—They are met with between the tropics of both hemispheres; some in Australia, beyond the tropics; and some in the warm parts of America north of the tropics.


PROPERTIES AND USES.—This family is remarkable for its highly poisonous virtues. It furnishes the plant which yields strychnia, or strychnine, and several other plants of an equally deadly character.

Spigelia marilandica, called *Pink-root* and *Worm-grass*, grows wild in the southern states of North America, and is a herbaceous plant, from a foot to a foot and a half high. The root is used in medicine as one of the most powerful anthelmintics, but it requires to be used with caution, as an overdose causes vertigo, dimness of vision, dilated pupils, spasms of the muscles of the face, and even convulsions. The root contains a fixed and volatile oil, a small quantity of resin, a bitter substance supposed to be the active principle, a mucilaginous saccharine matter, albumen, gallic acid, the malates of potassa and lime, and woody fibre. The plant is called *Unsteetla* by the Cherokees. All the species of *Spigelia* are dangerous, being acrid narcotics. Hartweg relates that one species growing in equatorial America kills dogs.

But the most deadly of the whole family is *Strychnos nux-vomica*, or *Poison Nut*. It is a native of the coast of Coromandel, Bengal, Ceylon, Malabar, and many other parts of the East. It is a middle-sized tree, covered with a smooth, ash-grey bark. The wood is white, hard, close-grained, and exceedingly bitter, and particularly that of the root, which is used by the natives to cure intermittent fevers and the bite of venomous snakes. The fruit is the size of a small orange, with a smooth, hard shell, of a beautiful orange colour when ripe, filled with white gelatinous pulp, which is perfectly harmless, and is greedily eaten by birds. The seeds imbedded in the pulp are like a thick, round lozenge, about the size of a shilling, whitish, hard, and horny, and in them the active principle is contained. They are used in the distillation of the spirits of the countries where they grow, to render them more intoxicating. The bark is that which is known in Europe as *False Angustura Bark*. The seed, called *Nux Vomica*, in very small doses often repeated, is stimulant and tonic, diuretic, diaphoretic, and laxative. It has long been employed in India, and was known as a medicine to the Arabian physicians. It has been recommended in Europe as an antidote to the plague, as a remedy in intermittents, dyspepsia, dysentery, diarrhoea of debility, worms, hysteria, rheumatism, and hydrophobia. When the seed or strychnia is taken in large doses, it produces the most fearful consequences. First, agitation and trembling, succeeded by stiffness and twitching of the limbs; these go on increasing, and at length comes a violent fit of spasm, in which the head is bent back and the spine stiffened, the legs extended and rigid, and the respiration checked by the fixing of the chest. Then comes a calm, during which the senses are entire and unnaturally acute, to be succeeded by another and successive spasms more violent than the last, and then death ensues by suffocation. *Nux vomica* has been analysed, and found to contain two alkaline principles, *strychnia*, or *strychnine*, and *brucia*, or *brucine*, united with a peculiar acid, called *igasuric* or *strychnic acid*. Strychnia is in the form of minute four-sided prisms, and is so poisonous that half a grain destroys a rabbit in five minutes in violent paroxysms of tetanus. Dr. Christison has killed a dog in two minutes, with one-sixth part of a grain injected into the chest; and he has seen a wild boar killed in the same manner, with the third of a grain, in ten minutes. Brucia is in scaly crystals resembling tale flakes. It is obtained from the bark, and has the same action as strychnia, but with less

intensity, strychnia being twelve-fold more powerful than brucia. M. Drapiez has ascertained, by numerous experiments, that the fruit of *Fevillea cordifolia* is a powerful antidote against this and other vegetable poisons.

Strychnos colubrinum is a native of Malabar and Ceylon, and the wood is what is called by the Portuguese *Pao de Cobra*. The wood of the root is considered a powerful remedy for the bite of the Cobra di Capella. *S. ligustrinum* is supposed to furnish what was formerly known as *Lignum colubrinum*. *S. toxifera* is a native of Guiana, and is a deadly poison; it is said to furnish the basis of the true Woorari poison. Dr. Hancock thinks it the most potent sedative in nature. *S. tieute* is a native of Java, and yields from the bark of the root an exceedingly violent poison, which acts exactly in the same manner as strychnia. *S. pseudo-quina* is used in Brazil in the same way as cinchona. Its fruit is perfectly harmless, and is eaten by children. *S. potatorum*, or *Clearing Nut*, is a native of India, and the fruit is eaten by the natives. The ripe seeds are sold in the bazaars for clearing water. The natives never drink clear well-water if they can get pond or river water, which is more or less impure. The seeds are rubbed for a minute or two round the inside of water-pots, and left to settle; in a very short time the impurities fall to the bottom, leaving the water clear and perfectly wholesome. The effect is so generally known that the seeds are usually carried by travellers in India. *St. Ignatius' Bean* is the seed of *Ignatia amara*, a native of Cochin China and the Philippine islands. The fruit is as large as a pear, covered with a rind like that of the gourd. The seeds contain a great deal of strychnia, but no brucia, and they have the same action on the animal economy as those of strychnos, causing tetanic convulsions and death. Judiciously administered, it has been proved to be a valuable medicine, and very useful in debility of the stomach and intestines accompanied with chronic induration of the mesenteric glands, and against atony of the eyes and dimness of vision, provided the patient does not suffer from nervous affections. It has also been found useful in epilepsy. The young branches and leaves of *Gardneria ovata* contain a yellow juice. An infusion of the leaves of *Potalia resinifera* is slightly mucilaginous and astringent, and is used in Brazil for inflamed eyes. *P. amara* is bitter, acrid, and emetic.



ORDER CXXX.—GENTIANACEÆ.—GENTIANS.

HERBACEOUS perennials, rarely small shrubs. *Leaves* simple, opposite, or in whorls, very rarely alternate or trifoliate, and without leaflets at their base. *Flowers* hermaphrodite, regular. *Calyx* five, rarely four or twelve-cleft, permanent. *Corolla* with the same number of lobes in the limb as there are divisions in the calyx, twisted or induplicate in æstivation, frequently fringed in the throat. *Stamens* five, alternate with the larger lobes of the corolla, and inserted in its tube, some of them sometimes abortive. *Ovary* free, one-celled, perfectly or imperfectly two-celled, very rarely with two complete cells, with marginal, many-ovuled ovule-bearers (placentæ). *Style* terminal, simple, or two-cleft; *stigmas* two. *Fruit* a capsule, with one or two many-seeded cells, and sometimes, but rarely, a berry. *Seeds* small, with a single covering. *Embryo* straight, in the axis of soft, fleshy albumen; *radicle* directed towards the hilum.



Fig. 154. *Ophelia eorymbosa*. A, Section of ovary of *Gentiana crueciata*; B, the capsule opening.

TRIBE 1. *Gentianeæ*.—Æstivation of the corolla twisted. Seed-covering membranaceous. Leaves

opposite, entire. Some of these are parasites.

SUB-TRIBE 1. *CHIRONIDÆ*.—Cells of the erect anthers opposite, without a connective.

GENERA AND SYNONYMES.

<i>Chironia</i> , L.	<i>Valerandia</i> , Nck.	<i>Voyriella</i> , Miq.	<i>Pneumonanthesis</i> ,
<i>Centaurium</i> , T.	<i>Plocandra</i> , E. Mey.	<i>Leianthostemon</i> ,	[Miq.]
<i>Roeslinia</i> , Mön.	<i>Gyrandra</i> , Griseb.	[Miq.]	<i>Lapithea</i> , Griseb.
<i>Orphium</i> , E. Mey.	<i>Exacum</i> , L.	<i>Disadena</i> , Mig.	<i>Dejanira</i> , Cham.
			<i>Calliopisma</i> , Mart

SUB-TRIBE 2. CHLORIDÆ.—*Anthers furnished with a connective. Style distinct, deciduous.*

GENERA AND SYNONYMES.

Sabbatia, <i>Ad.</i>	Schubleria, <i>Mart.</i>	Franquevillia,	Adenésma, <i>G. D.</i>
Eustoma, <i>Don.</i>	Curtia, <i>Cham.</i>	[Gray.	Enicostema, <i>Bl.</i>
Urananthus, <i>Gris</i>	Apophragma, <i>Griesb</i>	Orthostemon, <i>R. Br.</i>	Coutoubea, <i>Aubl.</i>
Zygostigma, <i>Griseb.</i>	Erythraea, <i>Ren.</i>	Pladera, <i>Griseb.</i>	Pierium, <i>Sehrb.</i>
Sebæa, <i>R. Br.</i>	Xanthea, <i>Reichb.</i>	Hoppen, <i>W.</i>	Schultesia, <i>Mart.</i>
Euschæa, <i>Gris.</i>	Cicendia, <i>Griseb.</i>	Hopea, <i>Vahl.</i>	Ixanthus, <i>Griseb.</i>
Phyllocalyx, <i>Gris</i>	Exacum, <i>DC.</i>	Causcora, <i>Lam.</i>	Chlora, <i>Ren.</i>
Lagenias, <i>E. Mey.</i>	Hippocentaurea,	Centaurium, <i>Bork</i>	Blackstonia, <i>Huds</i>
Belmontia, <i>E. Mey</i>	[Schlt.	Slevogtia, <i>Rehb.</i>	Xanthanthus,
Exochæmium, <i>Gris.</i>	Microcala, <i>Link.</i>	Hippion, <i>Sp.</i>	[Gris.

SUB-TRIBE 3. LISIANTHIDÆ.—*Anthers furnished with a connective. Style persistent, distinct from the double or simple stigma. All natives of the tropics of America, with the exception of Tachadenus, which inhabits Madagascar.*

GENERA AND SYNONYMES.

Hookinia, <i>Gardn.</i>	Irlbachia, <i>Mart.</i>	Tachia, <i>Aub.</i>	Voyria, <i>Aub.</i>
Anacolus, <i>Gris.</i>	Lisianthus, <i>L.</i>	Myrmecia, <i>Gm.</i>	Vohiria, <i>Juss.</i>
Pagrea, <i>Griseb.</i>	Ilelia, <i>Mart.</i>	Prepusa, <i>Mart.</i>	Lita, <i>Schreb.</i>
Petason-tylis, <i>Gris.</i>	Lisyanthus, <i>Aub.</i>	Tachadenus, <i>Gris.</i>	Humboldtia, <i>Neek</i>
Omphalostigma,	Leiothamnus, <i>Gris.</i>	Leianthus, <i>Gris.</i>	Leiphaimos, <i>Seh.</i>
[Gris.	Symbolanthus, <i>G. D.</i>		[& Cham.

SUB-TRIBE 4. SWERTIDÆ.—*Anthers furnished with a connective, unchanging. Stigmas persistent, placed on the ovary, or with the persistent style confluent with the stigmatic arms. Herbaceous plants, mostly inhabiting alpine or northern regions.*

GENERA AND SYNONYMES.

Gentiana, <i>T.</i>	„ Eurythalia, <i>Bork.</i>	Eudoxia, <i>G. Don</i>	Ophelia, <i>Don.</i>
Asterias, <i>Bork</i>	Gentianella, <i>Bork</i>	Crawfordia, <i>Wall.</i>	Agathotes, <i>Don.</i>
Cælanthe, <i>Bork.</i>	Pneumonanthe,	Tripterospermum,	Henricca, <i>Lem.</i>
Cininalis, <i>Bork.</i>	[Bunge	[Bl.	Szukinia, <i>Trez.</i>
Dasycephala, <i>Brk</i>	Crossopetalum,	Centaurella, <i>Mich.</i>	Monobothrium,
Dasycephala, <i>Brk</i>	[Roth	Centaurium, <i>Pers</i>	[Hochst.
Thylactes, <i>Ren.</i>	Cuttera, <i>Raf.</i>	Bartonia, <i>Muhl.</i>	Exadenus, <i>Gris.</i>
Urananthe, <i>Gaud</i>	Ericala, <i>G. Don.</i>	Andrewsia, <i>Sp.</i>	Halenia, <i>Bork.</i>
Calathina, <i>Fræl.</i>	Selatium, <i>G. D.</i>	Pleurogync, <i>Eschol.</i>	Tetragonanthus,
Tetrorhiza, <i>Ren.</i>	Eadotriche, <i>Fræl</i>	Lomatogonium,	[Stell.
Cyanea, <i>Ren.</i>	Ulostoma, <i>G. D.</i>	[Braun.	Frasera, <i>Wall.</i>
Trochantha, <i>Buge</i>	Andicola, <i>Gris.</i>	Anagallidium, <i>Gris</i>	Swertia, <i>L.</i>
Ericoila, <i>Bork</i>	Oreophylax, <i>Enll</i>	Stellara, <i>Turez.</i>	

TRIBE 2. Menyantheæ.—*Corolla induplicate in æstivation. Seed-covering woody. Aquatic or marshy plants with alternate sheathing leaves.*

GENERA AND SYNONYMES.

Villarsia, <i>Vent.</i>	Nymphoides, <i>T.</i>	Limnanthemum,	Schweyekherta,
Rencaalmia, <i>Houtt</i>	Menyanthes, <i>T.</i>	[Gmel.	[C. C. Gmel.
Trachysperma,	Menonanthus,	Waldschmidia,	Glyphospermum,
[Raf.	[Hall	[Wigg.	[G. D.
Cumada, <i>Jon.</i>			

GEOGRAPHICAL DISTRIBUTION.—The species are chiefly natives of cool and mountainous regions of Europe, Asia, and America, but extend also to the hottest parts of America and India.

PROPERTIES AND USES.—Bitterness is the characteristic property of this family, and it is so intense as to be second only to quassia.

Lesser Centaury (*Erythraea centaurium*) is a pretty little plant, common in dry gravelly pastures in Britain. Its flowering tops have a strong bitter taste, which becomes more intense in drying. This bitterness is owing to a principle called *centaurin*. The properties of the plant closely resemble those of Gentian, and it is frequently used as a simple tonic and febrifuge. It has also been found useful as a vermifuge, and against obstructions, chlorosis, and diseases of debility. *Sabbatia angularis*, or *American Centaury*, grows abundantly throughout the middle and southern states of America, where the whole plant is esteemed for its tonic properties. It has a strong bitter taste, without any astringency, and is very similar in its action to the other medicinal plants of the family. It is a popular medicine in America against intermittent and remittent fevers; and, though not so active as cinchona, it is useful between the paroxysms and during slow convalescence, by promoting appetite and invigorating the digestive functions; and it may be used for the same purpose in diseases of dyspepsia, and of debility.

Gentiana lutea (*Yellow Gentian*) is the plant which furnishes the Gentian root of the druggists. It is a native of the Alps and other mountainous regions of middle Europe, and generally grows in calcareous soils. The root is the only part used in medicine, and this is of a slightly sweet, and intensely bitter taste, without being nauseous. On analysis by M. M. Henry and Caventou, it was found to contain a peculiar crystallisable principle, which they called *gentianin*, and which they erroneously supposed furnished the active properties of the root; a volatile odorous principle; a substance identical with birdlime; a greenish fixed oil; a free organic acid; uncrystallisable sugar; gum; yellow colouring matter, and lignin. The bitter principle has been shown, by Professor Dulk, of Königsberg, to be a brownish, yellow, uncrystallisable substance, having, in a high degree, the bitter taste of the root. It is almost insoluble in absolute alcohol, but soluble in ordinary alcohol, and very soluble in water. It reddens litmus, and appears to possess acid properties. Gentian is the most powerful and energetic of the simple bitters. It excites the appetite, invigorates the digestive organs, moderately increases the temperature of the body, and acts as a general strengthening medicine. On dead animal matter it acts as an antiseptic. Several other species have the same properties, but in a milder degree, and are frequently used for adulterating the genuine root. Of these the most important are *G. rubra*, *purpurea*, *punctata*, and *pannonica*. *G. Catesbæi* is rather extensively used in America as a substitute for yellow gentian; and *G. Kurroo* answers the same purpose in India. In Britain some of our indigenous species, such as *G. amarella* and *G. campestris* are a popular medicine. *Ophelia* (*Agathotes*) *chirata* is a native of India, and the whole dried plant is used by the natives, in a state of infusion, as a stomachic, tonic, and febrifuge. Dr. Wallich thinks it contains more of the bitter principle than any of the Gentians. It is called by the natives *Chirata*, and is used for restoring the tone and activity of the moving fibres in

general debility, and in that kind of cachexy which is liable to terminate in dropsy. Some have supposed that, in addition to its tonic properties, it exerts a peculiar influence over the liver, promoting the secretion of bile, and correcting it when deranged, and restoring healthy evacuations in cases of habitual costiveness. Combined with the seeds of *Guilandina bonduce*, it is used in India as a cure in intermittents. *American Colombo* is the root of *Frasera Walteri*, which grows abundantly in many parts of the United States, and is used as a mild tonic, but its properties are not so active as the true colombo. The roots of *Lisianthus amplissimus* and *L. pendulus* are very bitter, and used as a febrifuge in Brazil.

The *Buck-bean*, or *Bean-trefoil* (*Menyanthes trifoliata*), is one of the most lovely of our native plants. It grows in marshy places, and is very plentiful in Britain, producing an abundance of its white-bearded, rose-coloured blossoms in May and June. The whole plant is intensely bitter, and somewhat nauseous, and its bitter properties depend on a principle called *Menyanthin*, which has a pure bitter taste, is soluble in alcohol and water, but not in pure ether, and is chemically neuter. Besides its bitter properties, which are equal to those of gentian, it possesses also cathartic properties, and in large doses acts as an emetic. It is a cheap and very valuable medicine, and ought to be more generally used. In a scarcity of hops this plant is used in the north of Europe to give a bitter to the beer; two ounces supplying the place of a pound of hops. Some people smoke the leaves. *Villarsia* (*Limnanthemum*) *nymphoides*, also a native of this country, has the same properties.



ORDER CXXXI.—BIGNONIACEÆ.—TRUMPET FLOWERS.

TREES or shrubs, often twining or climbing.

Leaves opposite, rarely in whorls, simple or compound, and without leaflets at their base. *Flowers* hermaphrodite, generally irregular. *Calyx* five-cleft, two-lipped, sometimes spathaceous. *Corolla* with five lobes, very much dilated at the throat, hypogynous. *Stamens* four, two long and two short, and a fifth which is a rudimentary one; *anthers* two-celled. *Ovary* free, two-celled, girded with a fleshy disk; *style* simple; *stigma* two-cleft, or of two plates. *Fruit* a capsule, sometimes in the form of a pod, with one, two, or four many-seeded cells, opening in two valves, parallel or transverse with the partition. *Seed* compressed, winged, and without albumen. *Embryo* straight, leafy, with a centrifugal radiicle.

TRIBE 1. Bignoniæ.—Partition (septum) of the ripe capsule parallel with the flat or convex valves.

Fig. 155. *Spathodea laevis*.A, Ovary of *Bignonia catalpa*; B, embryo of ditto.

GENERA AND SYNONYMES.

<i>Bignonia</i> , L.	<i>Calosanthus</i> , Bl.	<i>Mallingtonia</i> , W.	<i>Amphilophium</i> ,
<i>Stenolobium</i> Don	<i>Oroxylum</i> , Vent.	<i>Arrabidaea</i> , DC.	[<i>Knuth</i> .
<i>Temnocydia</i> Mart	<i>Cuspidaria</i> , DC.	<i>Vasconcella</i> , Mrt	<i>Pithecoctenium</i> Mrt
<i>Aloeydia</i> , Mart.	<i>Lochmocydia</i> Mrt	<i>Anemopaegma</i> Mart	<i>Delostoma</i> , D. Don.
<i>Batocydia</i> , Mart.	<i>Macfadyena</i> , A. DC	<i>Distictis</i> , DC.	<i>Cybistax</i> , Mart.
<i>Pachyptera</i> , DC.	<i>Lundia</i> , DC.	<i>Haplophium</i> Endl	<i>Phryganocydia</i> ,
<i>Fridericia</i> , Mart.	<i>Mansoa</i> , DC.	<i>Aplolophium</i> , Ch.	[<i>Mart</i> .
<i>Astianthus</i> , D. Don	<i>Millingtonia</i> , L.		<i>Adenocalymna</i> , Mrt

TRIBE 2. Catalpææ.—Partition of the ripe capsule opposite the flat or often convex valves.

GENERA AND SYNONYMES.

Sparattosperma <i>Mrt</i>	Tabebuia, <i>Go.n.</i>	Campsis, <i>Lour.</i>	Catophractes, <i>Don.</i>
Spathodea, <i>Palis</i>	Couralia, <i>Split.</i>	Tecomaria, <i>Phzl</i>	Platycarpum, <i>H. & B</i>
Dolichandra <i>Ch.</i>	Callichlamys, <i>Miq.</i>	Catalpa, <i>Scop.</i>	Rhigozum, <i>Burch.</i>
Heterophragma <i>DC</i>	Craterotecoma, <i>Mrt.</i>	Chilopsis, <i>D. Don.</i>	Argylia, <i>D. Don.</i>
Stereospermum, <i>Ch.</i>	Phaniceocissus,	Pajanelia, <i>DC.</i>	Oxymitra, <i>Prsl.</i>
Zeyhera, <i>Mart.</i>	[<i>Mart.</i>	Jacaranda, <i>Juss</i>	? Tourrettia, <i>Domb.</i>
Chasmia, <i>Schott.</i>	Tecoma, <i>Juss.</i>	Kordelestris, <i>Arr.</i>	Dombeya, <i>Herit.</i>

TRIBE 3. *Incarvilleæ*.—Capsule two-celled, one or both cells bursting longitudinally in the middle. Seeds pendulous, winged, or hairy on both sides. Radicle superior.

GENERA.

Incarvillea, *Juss.*

Amphicome, *R. Br.*

TRIBE 4. *Eccremocarpeæ*.—Capsule one-celled, with two valves bearing the seeds on their inner margin.

GENERA AND SYNONYMES.

Eccremocarpus,	Calampelis <i>DDon</i>	Dipterosperma,	Bravasia, <i>DC.</i>
[<i>Ruiz. & Pav.</i>	Pteropodium, <i>DC.</i>	[<i>Hassk.</i>	? Trigonocarpus,
			[<i>Wall.</i>

GEOGRAPHICAL DISTRIBUTION.—These are generally inhabitants of the tropics, and are most abundant in America, where they extend as far north as Pennsylvania.

PROPERTIES AND USES.—In the beauty of their flowers, and the diversity of their forms, these are among the most interesting of ornamental plants. In their native forests some of them attain the dimensions of lofty trees, and are among the brightest ornaments of tropical vegetation. The bark of *Bignonia leucoxydon* is considered an antidote to the poison contained in the fruit of the Manchineel; that of *B. equinoctialis* is bitter and astringent. The shoots of *B. echinata* are employed to adulterate sarsaparilla; and those of *B. chereri* are woven into wicker-work. The bark of the younger branches of *B. syphilitica* is considered in Brazil one of the most powerful remedies against malignant syphilitic swellings. A red dye is obtained by boiling the leaves of *B. chica* in water, and precipitating the decoction with the bark of an unknown tree called Arayana. With this pigment called *Chica* the Indians of South America paint their bodies. It is also used by dyers, and gives an orange-red colour to cotton. *B. ipuena* produces the hardest wood in Brazil; and another species, called *Pao d'arco*, supplies the best kind of wood used for bows by the Brazilian savages. The flowers of *Stereospermum chelonoides*, immersed in water, impart to it a grateful odour, which is employed in the east to sprinkle the temples in the morning. The Abyssinians make flutes of the bark of the young branches of *S. arguzana*, by rolling it on stieks, and allowing it to dry in that situation. The flowers of *Millingtonia hortensis* are very fragrant. The root of *Tecoma stans* is diuretic, and that of *T. radicans* is vulnerary and sudorific, and employed in America against the bites of poisonous serpents. *T. impetiginosa* contains a great quantity of tannin; its bark is bitter and mucilaginous, and is used in lotions, baths, and inflammations of the joints. *T. speciosa* is diuretic and cathartic. The leaves of *Sparattosperma lithontripectica* are bitter, acrid, and diuretic, and are used by the Brazilians in calculus.

The two following orders are nearly allied to Bignoniaceæ, and by some authors are considered merely as sub-orders or tribes:—

ORDER CXXXII.—CRESCENTIACEÆ—CALABASHES.

THEY differ from Bignoniaceæ in having a fleshy or woody fruit, which is unopening; seeds wingless, and imbedded in the pulp of the seed-bearer.

GENERA AND SYNONYMS.

Colea, <i>Boj.</i>	Athrophyllum,	Schlegelia, <i>Miq.</i>	Tanæcium, <i>Boj.</i>
Periblema, <i>DC.</i>	[<i>Boj.</i>	Crescentia, <i>L.</i>	Tripinnaria, <i>Pers.</i>
Boutonia, <i>DC.</i>	Parmentiera, <i>DC.</i>	Cujete, <i>Pl.</i>	Tripinna, <i>Lour.</i>
Phyllarthron, <i>DC.</i>	Tanæcium, <i>Sw.</i>	Kigelia, <i>DC.</i>	

These are all natives of the tropics of Asia, Africa, and America, and are most abundant in the Mauritius and Madagascar. The most important plant of the family is *Crescentia cujete*, or *Calabash Tree*, a native of the tropics of America, where it is called *Tutuma*. It attains the height of twenty feet. There are several varieties of the tree, producing various forms of fruit. These are from globose to bottle-shaped, and from two inches to a foot in diameter. The outer skin is thin and fleshy; the shell is hard and woody, enclosing a pale, yellowish, soft pulp, in which are imbedded a great number of flat seeds. When the pulp and seeds are removed, and the outer skin taken off, these shells are used by the natives for all sorts of vessels; and some of the long, small, fruited kinds serve for spoons and ladles. Some are large enough to hold a gallon, and as they stand the fire well, they serve to boil water in. The thicker parts are used as button-moulds. The Caribs engrave the outside with a number of grotesque figures, which they sometimes colour black or red. The pulp is sometimes eaten, but is not agreeable, and is sometimes used as a poultice; a syrup made of it is esteemed by the natives for disorders of the breast, in contusions and inward bruises. The wood is very tough and flexible, fit for coach-making, and is frequently used for making saddles, stools, and furniture. The leaves and branches are eaten by cattle in times of scarcity. The pulp of *Tanæcium jarova* is used for the same purpose as that of the above, but the shell is quite fragile. *Parmentiera edulis* has fruit like the cucumber, and affords food to the Mexicans. The fruit of *P. cerifera* is like a long candle, and hence it is called *Palo de velas* or *Candle-tree* in Panama. It is greedily eaten by cattle. *Kigelia abyssinica*, or *Meder-Deur*, is said to possess aphrodisiacal qualities of the most formidable and incredible description.

ORDER CXXXIII.—PEDALIACEÆ—PEDALIA FAMILY.

THE wingless seeds, which are definite in number, and the woody-lobed seed-bearers (placentæ) attached to the inner wall of the fruit, are the characters which distinguish this family from Bignoniaceæ.

GENERA AND SYNONYMES.

Sesamum, <i>L.</i>	Martynia, <i>L.</i>	? Neowedia, <i>Schrd.</i>	Cacatali, <i>Ad.</i>
Dysosmon, <i>Raf.</i>	Proboscidea,	Josephinia, <i>Vent.</i>	Rogeria, <i>Gay.</i>
Sesamopteris, <i>DC.</i>	[<i>Schmid.</i>	Pterodiscus, <i>Hook.</i>	Harpagophytum,
Simsimum <i>Bernh.</i>	Carpoceras, <i>A. Rich.</i>	Pretra, <i>Gay.</i>	[<i>DC.</i>
Gongyla, <i>Bernh.</i>	Craniolaria, <i>L.</i>	Dicercaryum <i>Boj</i>	Uncaria, <i>Burch.</i>
Coratotheca, <i>Endl.</i>	Holoregmia, <i>Nees</i>	Pedaliium, <i>Royen.</i>	Ichnia, <i>DC.</i>
Sporledera, <i>Bernh.</i>			

They are mostly natives of India, the Cape of Good Hope, and Australia. The plants which command the greatest attention are *Sesamum orientale* and *S. indicum*, the seeds of both of which yield a great quantity of oil. They are both natives of India, and are known under the name of *Tilseed*. *S. indicum* is universally cultivated throughout the East, from Egypt to Japan, for its seeds, from which *Gingilie oil* is obtained by expression. The oil is much used as an article of diet, for burning, and for frictions. It is without smell, has a sweet taste, and will keep for years without becoming rancid or thick. In Japan, where they have no butter, they use the oil for frying fish, and in dressing other dishes. In Egypt and Arabia it is preferred to olive oil, though in reality much inferior to it. Besides its economical uses, the oil and preparations made from it are in use as medicines and cosmetics among the Egyptians. The women consider there is nothing so well calculated to cleanse the skin, and give it a bloom and lustre; to preserve the beauty of the hair, and to increase the quantity of milk when they become mothers. The Egyptian physicians use it as a cure in ophthalmia, and inflammatory humours of the eyes, but no confidence can be placed in its curative virtues. Sesamum oil is insoluble in alcohol, readily saponifies with the alkalis, and combines with the oxide of lead. Dr. O'Shaughnessy says, for all purposes of medicine and pharmacy it is, when well prepared, equal to the best olive oil. The oil-cake, mixed with honey and preserved citron, is esteemed an oriental luxury; and the cake alone has been recommended as a food for bees. Nine pounds of the seed yields two quarts of perfectly sweet oil. It is called in India *Meetha til*, or *Til ke tel*; that made and exported from Persia is called *Kurit schuk*. The seeds are either yellow or black, the former being called *Kala til*, and the latter *Suffed til*. The leaves of both species abound in a gummy matter, which is readily imparted to water, forming a rich, bland mucilage, much used in the southern states of America as a drink, in various complaints in which demulcents are used. The seeds of *S. indicum* are strewed on cakes in Egypt, and communicate to them a nutty flavour. *Pedaliium murex* is a native of India. The fresh plant renders water or milk very mucilaginous, without altering the taste, colour, or smell of the liquid, but the effect goes off in the course of a few hours. Buttermilk, which is often sold in the markets of India, is frequently diluted with water and then thickened by turning it round a few times with the fresh leafy branches of this plant, which makes it seem rich and of the best sort. The fruit of *Uncaria procumbens*, a native of the Cape of Good Hope, is very much covered with hooked spines, and cause great annoyance to travellers by adhering to their clothes. The natives of Venezuela prepare a bitter and cooling drink from the dried roots of *Craniolaria annua*, and they also preserve them in sugar to eat as a delicacy.

ORDER CXXXIV.—GESNERACEÆ—GESNERA FAMILY.

HERBS, rarely under-shrubs. *Leaves* opposite or in whorls, rarely alternate, simple, and without leaflets at their base. *Flowers* hermaphrodite, irregular. *Calyx* with five unequal lobes, free, or more or less adherent to the ovary. *Corolla* irregular, with five unequal lobes, sometimes two-lipped. *Stamens* four, two longer than the other two, sometimes five, of which one is sterile. *Ovary* sometimes superior, sometimes inferior; in the former case the disk is hypogynous or lateral, and in the latter it is epigynous, and frequently lobed; one-celled, with two marginal many-ovuled ovule-bearers. *Style* simple, terminated by a capitate stigma, which is either concave in the centre or two-lobed. *Fruit* either a berry or a capsule, one-celled, many-seeded, opening in two valves. *Seeds* minute and numerous, with or without albumen, which, when present, is fleshy, enclosing in its axis an erect embryo, with seed-lobes shorter than the taper radicle.



Fig. 166. *Episcia mellitifolia*
A, Section of the ovary of
Gloxinia caulecens.

SUB-ORDER I.—GESNEREÆ—Seeds albuminous.

TRIBE 1. *Beslerieæ*.—Calyx free, not adherent to the ovary. Corolla inserted in the base of the calyx.

GENERA AND SYNONYMS.

<i>Sarmienta</i> , R. & P.	<i>Crantzia</i> , Scop.	<i>Klugia</i> , Schlecht.	<i>Besleria</i> , Mart.
<i>Urecolaria</i> , Feuill.	<i>Dalbergaria</i> , Tuss.	<i>Drymonia</i> , Mart.	<i>Eriphia</i> , P. Br.
<i>Episcia</i> , Mart.	<i>Nematanthus</i> Schrd.	<i>Columna</i> , Pl.	<i>Tussaea</i> , Rehb.
<i>Alloplectus</i> , Mart.	<i>Tapeinotes</i> , DC.	<i>Hypocyrtia</i> , Mart.	<i>Aretoealix</i> , Fenzl.
<i>Lophia</i> , Desv.	<i>Tapina</i> , Mart.		

TRIBE 2. *Gesneridæ*.—Tube of the calyx more or less, but evidently adherent to the ovary. Corolla inserted at the top of the tube.

GENERA AND SYNONYMES.

Mitraria, Cav.	Gloxinia, Herit.	Conradia, Mart.	Sisyrocarpum, Kl.
Pieria, Lour.	Sinningia, Nees.	Pentaraphia, Lindl.	Solenophora, Benth.
Achimenes, P. Br.	Paliavana, Vell.	Rytidophyllum, [Mart]	Bellonia, Bl.
Cyrilla, Herit.	Gesnera, Mart.	Codonophora, [Lindl.]	Diastemma, Benth.
Trevirana, W.	Gesneria, DC.		Trichantha, Hook.
Nipheæ, Lindl.	Paliavana, Vaud.		

SUB-ORDER II.—CYRTANDREÆ—Seeds without albumen.

TRIBE 1. *Didymocarpeæ*.—Fruit a capsule, opening. Seeds mostly naked, very often pendulous.

Liebigia, Endl.	Calosacme, Wall.	Rynchoglossum, Bl.	Loxocarpus, R. Br.
Tromsdorffia, Bl.	Streptocarpus, Lindl.	Loxotis, R. Br.	Quintilia, Endl.
Babaetes, DC.	Henckelia, Sp.	Antonia, R. Br.	Miquelia, Bl.
Æschynanthus, Jack.	Bæa, Comm.	Knappia, F. Bau.	Anomorhegmia, [Meisn.]
Trichosporum, [Don.]	Doreoceras, Bnge.	Napeanthus, Gard.	Staurationthera, Benth.
Agalmyla, Bl.	Cardiophorus, Griff.	Rechmannia, Libosch.	Epithema, Bl.
Orithalia, Bl.	Ramondia, Rich.	Klugia, Schlecht.	Aikinia, R. Br.
Lysionotus, Don.	Myconia, Lapey.	Glossanthus, [Klein.]	Platystemma, Wall.
Didymocarpus, Wall.	Chaixia, Lapey.	Loxonia, Jack.	? Isanthera, Nees.
Roettleria, Vahl.	Haberlea, Friwald.	Rhabdothermus, [A. Cunn.]	Championia, Gard.
Chirita, Ham.	Conandron, S. & Z.		
	? Monophyllæa, [R. Br.]		

TRIBE 2. *Cyrtandridæ*.—Fruit fleshy, unopening. Seeds naked, pendulous.

GENERA AND SYNONYMES.

Cyrtandra, Forst.	Rhynchothecum, [Endl.]	Cheilosandra, [Griff.]	Centronia, Bl.
Whitia, Bl.	Corisanthera, [Wall.]	Centronota, DC.	Gasparia, Endl.
Rhynchothecum, Bl.			Tronicena, Steud.
			Fieldia, A. Cunn.

GEOGRAPHICAL DISTRIBUTION.—The Gesnerææ are all natives of the New World, growing most abundantly between the tropics, where some are parasitical on the old trunks of trees; beyond the tropics they are rare. The Cyrtandridæ inhabit tropical Asia, particularly the islands of the Indian Ocean; they are also met with in the warm declivities of the Himalayas, and the interior of the Cape of Good Hope, but in Australia, and New Zealand they are rare. Klugia is a native of Mexico, and Ramondia and Haberlea are met with in Europe.

PROPERTIES AND USES.—None of these are remarkable for their properties, but this deficiency is made up by the beauty and elegance of their flowers; without which our stoves and greenhouses, during the winter and spring months, would have a less gay appearance than they now have. The fruit of some of the Gesnerææ are succulent, with a sweet, mucilaginous, eatable pulp. The herbaceous part, and the fruit of some are used as a dye for cotton, wool, and straw-work. The leaves of *Sarcienta repens* are used by the Chilians to soften hard skin, and corns of the feet. *Columnnea scandens* climbs upon trees in Chili, and is called *Liane à Sirop*, because its large, glandular disk secretes a great quantity of honey. Some species of *Didymocarpus* are aromatic; and the leaves of *Pieria* are bitter.

ORDER CXXXV.—POLEMONIACEÆ—PHLOX-FLOWERS.

HERBS, rarely shrubs, sometimes climbing.

Leaves alternate, the inferior ones sometimes opposite, often divided or pinnated. *Flowers* hermaphrodite, regular. *Calyx* five-cleft. *Corolla* hypogynous, one-petalled, funnel-shaped or tubular, divided into five almost equal lobes. *Stamens* five, inserted on the corolla, and alternate with its lobes. *Ovary* free, girdled at the base with a fleshy disk; three-celled, each containing a solitary anatropal ovule, or several ascendant and amphitropal ovules. *Style* terminal, simple, surmounted by a three-cleft stigma. *Fruit* a membranous or almost woody capsule, with three cells and three valves, opening either through the valves (loculicidally) or through the partitions (septicidally). *Seeds* angular, oval, or winged, ascending, sometimes enveloped in mucus. *Embryo* straight, in the axis of copious horny albumen, with an inferior radicle, and very short, elliptical, leafy seed-lobes.



FIG. 107. *Cantua brevifolia*. A, Capsule of *Polemonium*; B, capsule of *Collomia*; C, embryo of ditto.

GENERA AND SYNONYMES.

Phlox, L.

Collomia, Nutt.

Navaretia, R. & P.

Agrochloa, Benth.*Courtoisia*, Rehb.*Gilia*, R. & P.*Huzelia*, Benth.*Linanthus*, Benth.*Leptosiphon*, Benth.*Dianthoides*, Endl.,, *Rosmaritiera*,

[Reichb.

Fenzlia, Benth.*Ipomopsis*, Mich.*Ipomeria*, Nutt.*Brickelia*, Raf.*Leptodactylon*,

[Hook

Welwitschia Rehb.*Polemonium*, L.*Lueselia*, L.*Holtzia*, Juss.*Royena*, Houst.*Caldasia*, W.*Bonplandia*, Cav.*Cantua*, Juss.*Periphragmos*,

[R. & P.

Schizocodon, Zucc.*Cobara*, Cav.

GEOGRAPHICAL DISTRIBUTION.—Very rare in central Europe and northern Asia, and more numerous in North and South America beyond the tropics; on the western shores they are plentiful. Some are found in marshy places in the warm parts of Mexico, but they are rarely found within the tropics.

PROPERTIES AND USES.—Though we cannot regard any of these as useful plants, yet they are among the most ornamental in our flower-gardens. The *Phloxes*, *Gilias*, *Ipomopsis*, and *Cobæas* are familiar to all lovers of flowers.

Nearly associated to Phlox-flowers, but perhaps still more so to Heath-blooms, is the following:—

ORDER CXXXVI.—DIAPENSIACEÆ.—DIAPENSIA FAMILY.

THIS differs from the preceding order chiefly in having imbricated bracts, transversely two-celled anthers, and peltate seeds.

GENERA.

Diapensia, *L.* | *Pyxidanthera*, *Mich.*

These are pretty little evergreen alpine plants, natives of North America and the north of Europe, where they are generally found on the highest mountains growing among moss.



ORDER CXXXVII.—HYDROPHYLLACEÆ.—WATER-LEAVES.

HERBS or shrubs. *Leaves* mostly alternate, the lower ones sometimes

opposite, generally lobed, and without leaflets at their base. *Flowers* hermaphrodite, regular. *Calyx* deeply five-cleft, or often five-parted, permanent. *Corolla* of one petal, hypogynous, five-cleft or five-lobed at the apex. *Stamens* five, inserted in the base of the corolla, alternate with its lobes; *filaments* slender; *anthers* turning as if on a swivel, two-celled. *Ovary* free, one-celled, rarely two-celled; generally containing two, or, more rarely, a great number of amphitropal ovules, attached in pairs to two ovule-bearers projecting like two half partitions. *Style* filiform, terminal, two-cleft. *Fruit* a membranous or slightly fleshy capsule with one or two incomplete cells, two-valved, and opening through the valves. *Seeds* reticulated, with abundant cartilaginous albumen, containing a straight embryo with its radicle next the hilum.



Fig. 163. *Wigandia caracasana*. A, Ovary of *Eutoca sericea*.

GENERA AND SYNONYMES.

Hydrophyllum, T.
Decemium, Raf.
Pholistoma, Liljz.
Nemophila, Nutt.
Ellisia, L.

Nyctelæa, Scop.
Microgenetes A. DC.
Eutoca, R. Br.
Heteryta, Raf.
Whitlavia, Harv.

Miltitzia, A. DC.
Cosmanthus, Nolte.
Phacelia, Juss.
Aldea, R. & P.
Endiplus, Raf.

Emmenanthe Benth
Hydrolea, L.
Steris, Burm.
Sagonca, Aub.
Reichelia, Schreb
Wigandia, Kunth.
Eriodictyon, Benth.
Nama, L.
Romanzoffia, Cham.
Codon, Rozen.

Natives of South America and the East Indies; one is found at the Cape of Good Hope, and one in arctic America. *Hydrophyllum canadense* is used against the bites of serpents and the effects of the exhalations from *Rhus toxicodendron*. *Wigandia urens* stings like a nettle.

ORDER CXXXVIII.—CONVOLVULACEÆ.—BINDWEEDS.

HERES, shrubs, or small trees, sometimes with a twining growth.



Fig. 169. *Pharbitis limbata*. A, Pistil of *Pharbitis hispida*; B, capsule of ditto; C, ditto with valves removed; D, embryo; E, ditto with seed-lobes expanded.

Leaves alternate, simple, without leaflets at their base. *Flowers* hermaphrodite, regular. *Calyx* with five unequal divisions, the edges of which overlap each other. *Corolla* bell-shaped or funnel-shaped, quite entire, and five-plaited. *Stamens* five, inserted in the base of the corolla. *Ovary* free, with two to four often incomplete one to two-ovuled cells, sometimes one-celled and three to five-ovuled, as in *Erycibe*; *style* thread-like, simple, or divided; *stigmas* two to four, either distinct or united. *Fruit* a capsule, either membranous or succulent, with two, three, or four cells, each containing one or two seeds attached at the base of a loose partition; sometimes a one-seeded berry. *Seeds* with a

black, hard, and sometimes cottony covering. *Albumen* thin, mucilaginous, inclosing a curved embryo with plaited, leafy seed-lobes, and an incurved inferior radicle next the hilum.

TRIBE 1. *Argyreicæ*.—Carpels united so as to form a single ovary. Fruit unopening, leathery, or somewhat berry-like.

GENERA AND SYNONYMS.

<i>Rivea</i> , <i>Chois.</i>	<i>Legendrea</i> , <i>Webb.</i>	<i>Samudra</i> , <i>Endl.</i>	<i>Endrachium</i> , <i>Juss.</i>
<i>Maripa</i> , <i>Aub.</i>	<i>Marcellia</i> , <i>Mart.</i>	<i>Ptyxanthus</i> , <i>G.D.</i>	<i>Smithia</i> , <i>Gmel.</i>
<i>Dicranostyles</i> , <i>Benth.</i>	<i>Argyreia</i> , <i>Lour.</i>	<i>Blinkworthia</i> , <i>Chois.</i>	<i>Thouinia</i> , <i>Sm.</i>
<i>Lysiostyles</i> , <i>Benth.</i>	<i>Lettsomia</i> , <i>Roxb.</i>	<i>Humbertia</i> , <i>Com.</i>	<i>Moorcroftia</i> , <i>Chois.</i>

TRIBE 2. *Convolvulæ*.—Carpels united into a single ovary. Fruit capsular, opening.

* *Style simple.*

GENERA AND SYNONYMES.

Quamoclit, <i>T.</i>	Pharbitis, <i>Chois.</i>	Elytostamma <i>Boj</i>	Aniseia, <i>Chois.</i>
Calboa, <i>Cav.</i>	Convolvuloides,	Operculina <i>Manso</i>	Polymeria, <i>R. Br.</i>
Macrostema,	[<i>Mön.</i>	Piptostegia.	Calystegia, <i>R. Br.</i>
[<i>Pers.</i>	Ornithosperma,	[<i>Hoffm.</i>	Schutereaia, <i>Chois.</i>
Exogonium, <i>M&S</i>	[<i>Raf.</i>	Leptocallis, <i>G. D.</i>	Palmia, <i>Endl.</i>
Morenoa, <i>L. & L.</i>	Calonyction, <i>Chois.</i>	Jacquemontia <i>Chois</i>	Hewittia, <i>Steud.</i>
Mina, <i>Ll. & Lex.</i>	Bonanox, <i>Raf.</i>	Convolvulus, <i>L.</i>	Porana, <i>Burm.</i>
Batatas, <i>Rumph.</i>	Exogonium, <i>Chois.</i>	Rhodorrhiza,	Dinctus, <i>Sweet.</i>
Bombycospar-	Lepistemon, <i>Bl.</i>	[<i>Webb.</i>	Duperreya, <i>Gaud.</i>
[<i>mum, Presl.</i>	Ipomœa, <i>L.</i>	Merremia, <i>Denn.</i>	

** *Style divided, or several styles.*

GENERA AND SYNONYMES.

Neuropeltis, <i>Wall.</i>	Reinwardtia, <i>Sp.</i>	Bonamia, <i>Thouars.</i>	Cladostyles <i>HBK</i>
Prevostea, <i>Chois.</i>	Dethardingia, <i>N.</i>	Cressa, <i>L.</i>	Meriana, <i>Vell.</i>
Calycobolus, <i>W.</i>	[<i>& M.</i>	Seddera, <i>Hochst.</i>	Stylisma, <i>Raf.</i>
Dufourea, <i>H.B.K</i>	Breweria, <i>R. Br.</i>	Evolvulus, <i>L.</i>	Wilsonia, <i>R. Br.</i>

TRIBE 3. Dichondræ.—Carpels two or four, distinct. Fruit dry.

GENERA AND SYNONYMES.

Dichondra, <i>Forst.</i>	Anonymos, <i>Walt.</i>	„ Hygrocrocis,	? Hygrocharis,
Steripha, <i>Gärt.</i>	Nephrophyllum, <i>A.</i>	[<i>Hochst.</i>	[<i>Hochst.</i>
Demidofia, <i>Gmel.</i>	[<i>Rich.</i>		Falkia, <i>L. f.</i>

TRIBE 4. Erycibæ.—Fruit a one-seeded berry.

GENUS AND SYNONYMES.

Erycibe, <i>Roxb.</i>	„ Erimatalia, <i>R. & S.</i>
Catonia, <i>Vahl.</i>	Erysibe, <i>G. Don.</i>

DOUBTFUL GENERA.

Mouroucoa, <i>Aub.</i>	Calibrachea, <i>Ll. & Lex.</i>
Diplocalymna, <i>Sp.</i>	Crevia, <i>Rod.</i>

GEOGRAPHICAL DISTRIBUTION.—They are most plentiful between the tropics, and in moist situations in the warm parts of the globe; they are rare in temperate climates, decrease in numbers towards the poles, and in the coldest regions they are not found.

PROPERTIES AND USES.—The roots of these plants contain an acrid, milky juice, on which their medicinal properties depend. They include some of our most ornamental indigenous and exotic plants. Among the former of which, not the least beautiful is the Common Bindweed of our hedges (*Calystegia sepium*), and among the latter, the numerous species of *Ipomœa*, *Convolvulus*, *Pharbitis*, *Rivea*, and many other genera. The flowers of *Rivea bonanox* are large and pure white, expanding at sunset, and perfuming the air to a great distance with a fragrance resembling that of the finest cloves. It is a native of Bengal, where it rambles among the

forests, and is called *Midnapore Creeper*. The roots of *Batatas edulis* (*Convolvulus batatas*), or *Sweet Potato*, are used as an article of food. It is a native both of the East and West Indies, and is universally cultivated throughout the tropics and in Spain and Portugal, with the same assiduity, and with the same object, as we do potatoes; in fact they were, during the time of Queen Elizabeth, largely imported from Spain and Portugal to this country under the name of potatoes, before the root now so well known by that name had been introduced. They are the potatoes which Shakespere refers to in "The Merry Wives of Windsor," when Falstaff says, "let the sky rain potatoes and hail kissing-confits." The roots are long and tapering at both ends, about the size of a small parsnip. They are fleshy, and either farinaceous or waxy according to the variety, sweet, agreeable to the taste, and furnish a nutritious aliment.

From the roots of *Ipomœa (Exogonium) purga*, the drug called *Jalap* is obtained. It is a native of Mexico, at an elevation of 6,000 feet above the sea, and is found in the neighbourhood of Xalapa, a city in the state of Vera Cruz, hence the derivation of the word Jalap. The roots, when fresh, are long and spindle-shaped, white, fleshy, and abound in an acrid, milky juice. On analysis, M. Cadet de Gassicourt obtained, from 500 parts of jalap, 24 of water, 50 of resin, 220 of gummy extract, 12.5 of albumen, 145 of lignin, 16.3 of saline matters, 2.7 of silica, with a loss of 17 parts. The resin is of two kinds, one soft and soluble in ether, and the other hard and insoluble; the latter possesses acid properties, and is called by Kaiser *rhodoretin*, which is said to be identical with *jalapin*. Jalap is a powerful purgative, and if given in too large doses causes violent purging, inflammation of the intestines, and other serious consequences. It is administered in cases of dropsy, and also in bilious fever and other complaints attended with congestion of the liver. It is said to purge when applied to a wound. The *Male Jalap* of Mexico is said by M. Ledanois to be the root of *Convolvulus orizabensis (Ipomœa mestitlanica, Chois)*; but Mr. Hartweg says it is derived from *I. batatoides*. In the United States, the roots of *I. pandurata* are used as Jalap; those of *I. operculata* have the same purgative properties. The leaves of *I. maritima* are used in decoction, in Brazil, as a fomentation in scrofulous enlargements of the joints. The roots of *I. turpethum* are gorged with acrid milky juice, and are used by the natives of Bengal as a purgative; rubbing up a slip of the bark with water, on a stone, and swallowing the emulsion thus formed.

Convolvulus scammonium is a native of Syria and the Levant. The plant has a large, tapering, fleshy root, three to four feet long, nine to twelve inches in circumference, and abounding in a milky juice. It is this juice, in a concrete form, which constitutes the drug called *Scammony*. It is collected in several ways, which give rise to the several varieties. The neck of the root being laid bare, it is cut transversely, and shells are placed round the edges to receive the juice as it exudes. This subsequently thickens in the air, and is called *shell scammony*. Instead of shells, the leaves of the chesnut tree are sometimes used, and a flattened scammony of good quality collected. If the roots be cut in successive layers, the scammony is inferior, but still esteemed. It is dried either over a slow fire or in the sun, and then moulded into stamped pastiles of a whitish colour. An extract is prepared from the expressed juice of the roots and stalks; this is moulded into round

masses, of a black, vitreous, and resinous fracture. Scammony is considered a gum-resin, and, as analysed by Dr. Christison, was found to contain in 100 parts, 77 to 83 of resin, 6 to 8 of gum, 3.2 to 5 of lignin and sand, and from 7.2 to 12.6 of water, with occasionally a little starch. In its medicinal action it is a violent purgative, apt to cause griping, and is therefore seldom used except along with other cathartics, by which its action is mitigated and theirs promoted. The root of *C. scoparius* has a strong smell of roses, and a bitter, balsamic taste. *C. dissectus* abounds in prussic acid, and is said to be one of the plants from which the liqueur *Noyau* is prepared. The roots of *Calystegia sepium* (Common Bindweed) and *Convolvulus arvensis* (Small Bindweed), both natives of Britain, contain cathartic resin. *C. soldanella* contains 24 per cent. of it. The powdered seeds of *Pharbitis cœrulea* act as a quick, safe, and pleasant cathartic, in doses of 30 or 40 grains. The species of *Rhodorhiza* yield, by distillation, an essential oil, of a bitter, balsamic flavour, called *Oil of Rhodium*. *Cressa cretica* has a saline taste, slightly astringent, and is diuretic.

CUSCUTACEÆ—DODDERS.

THIS small family is very nearly allied to Convolvulacæ, of which it was formerly, and still is, by many botanists, considered merely a tribe. Choisy still considers it as such, in De Candolle's *Prodromus*; but, as many eminent botanists, among whom are Endlicher, Link, and Bartling, give it the prominence of a separate order, and as, in our own judgement, it is possessed of characters which are not found in the Convolvulacæ, we have inserted it as a pendicle to that order.

The plants are all leafless, and true parasites. The characters which distinguish them from the Convolvulacæ are, in having scales adhering to the inner surface of the corolla, and alternating with its lobes, and a spiral, thread-like embryo, without seed-lobes.

GENERA AND SYNONYMES.

<i>Cuscuta</i> , T.	<i>Epilinella</i> , Pfeiff.
<i>Grammicia</i> , Lour.	
<i>Lepidanchœ</i> Englm	
	<i>Engelmannia</i> , Pfeiff

These are found in the temperate parts of both hemispheres. They are a very remarkable class of plants, existing as parasites on other plants, and causing great annoyance to



Fig. 170. *Cuscuta californica*.
1, The flower magnified; 2, corolla laid open, but without the scales; 3, the pistil; 4, section of ovary.

farmers and others in soils where they have established themselves. There are two species indigenous to Britain. *Cuscuta europæa*, or *Great Dodder*, is found on flax, nettles, grass, hops, ferns, thistles, and many other plants. *C. epithymum*, or *Lesser Dodder*, is plentiful in cultivated fields, particularly among pulse, and also on furze, flax, thyme, nettles, heath, lavender, spurge, hops, grass, &c. It is, in some parts, called by the common people *Devil's-guts*, and *Hell-weed*. Professor Henslow admirably describes their habit, as being like "fine, closely tangled, wet catgut," which is some approach to the popular idea. The plant is bitter and astringent, and appears to contract, in some degree, the properties of the plants on which it grows. It has been administered in rheumatism, gout, and dropsy, but is now never used. The juice of *C. miniata*, *C. racemosa*, and *C. umbellata*, is given against hoarseness, and spitting of blood in Brazil; and the powder of them is applied to wounds to accelerate healing.

The next family has a close affinity with Convolvulacæ, differing only in its inverted embryo; but some botanists refer it to Boragacæ, with which it has not such a close alliance, being distinguished by the longitudinally plaited seed-lobes, forked style, and drupaceous fruit.

ORDER CXXXIX.—CORDIACEÆ—CORDIA FAMILY.

TREES, with alternate rough leaves. Calyx four to five-lobed. Corolla four to five-cleft, regular. Stamens alternate with the lobes of the corolla. Anthers versatile. Ovary superior, four to eight-celled; stigma four to eight-cleft. Fruit a drupe, four to eight-celled. Seeds without albumen, and with plaited seed-lobes.

GENERA AND SYNONYMES.

Gynaion, A. DC.	Firenzia, Neck.	Cerdana, R. & P.	Myxa, Endl.
Varronia, DC.	Borellia, Neck	Rhabdocalyx, ADC	Sebestena, Gärt.
Cordia, Pl.	Sacellium, H. B. K.	Pilicordia, A. DC.	Diacoria, Endl.
Varronia, L.	Geraceanthus, P. Br	Physoclada, A. DC.	

These are natives of the tropics. Their fruit has a viscid, mucous flesh, with an astringency and sweetness; some are acid, and from the seeds a sweet oil is extracted. The fresh fruits are glutinous, and slightly extractive. *Cordia sebestena* is a native of the West Indies, and a small piece of the wood, put on a pan of lighted coals, will perfume the whole house with a most agreeable smell. Turkey and other poultry feed on the fruit of *C. collocoeca*, called *Turkey-berry Tree* and, on account of its clammy consistence, is called *Clammy Cherry*. The fruits of *C. myxa* and *C. latifolia* are used as medicine in India, under the name of *Sebestens*. The wood of the former is soft, one of the best for affording fire by friction, and is supposed to be the material used for Egyptian mummy cases. The wood of *C. Rumphii* is beautifully marked with black veins, and smells strongly of musk. The fruit of *C. abyssinica* is eaten by the Abyssinians; and the berries of *Varronia rotundifolia* fatten cattle and poultry.

ORDER CXL.—BORAGACEÆ.—BORAGE FAMILY.

HERBS, shrubs, or trees. *Leaves* simple, alternate, often covered with hairs, which are more or less stiff and long. *Flowers* hermaphrodite, regular, or irregular, as in *Echium*; arranged in one-seeded spikes, rolled in the form of a crosier at their summit before they expand. *Calyx* five, rarely four parted. *Corolla* hypogynous, one-petalled, with five teeth or lobes, sometimes furnished at the throat with small scales, tufts of hairs, or arched processes. *Stamens* five, inserted on the corolla, and alternate with its lobes. *Ovary* set on a hypogynous, annular disk, four-lobed, with four one-seeded cells, and



Fig. 171. *Symphytum officinale*. A, The pistil; B, section of a nut.

deeply depressed in the centre; ovules attached to the lower point of the cavity, amphitropal. *Style* simple, arising from between the lobes of the ovary. *Stigma* either undivided or lobed. *Fruit* composed of two or four seed-nuts, one-celled, one-seeded, unopening, smooth, as in *Myosotis*, rough at the centre, as in *Cynoglossum*, or surrounded with a reflexed, membranous margin, as in *Omphalodes*. *Seeds* without albumen. *Embryo* with a superior radicle, and seed-lobes parallel with the axis.

TRIBE 1. *Cerinthæ*.—

Nuts two, two-celled, seated on the disk, free from

the gynobase or style. Corolla regular; throat naked.

GENUS.

Cerithe, T.

TRIBE 2. *Echieæ*.—Nuts four, distinct, one-celled, not perforated at the base, seated on the disk, and free from the style or gynobase. Corolla more or less irregular, always naked at the throat.

OENERA AND SYNONYMES.

Echiochilon, Desf.
Chilochium, Raf.

Echium, L.
Macrotomia, DC.

Lobostemon, Lehm.
Echiopsis, Rehb.

TRIBE 3. *Anchuseæ*.—Nuts four, distinct, one-celled, perforated and concave at the base, seated on the disk, and free from the style or gynobase. Corolla regular, furnished with arched processes below the middle of its lobes.

GENERA AND SYNONYMES.

<i>Nonnea</i> , <i>Medik.</i>	<i>Borago</i> , <i>T.</i>	<i>Stomotechium</i> , <i>Leh.</i>	<i>Lycopsis</i> , <i>L.</i>
<i>Oskampia</i> , <i>Mön.</i>	<i>Psilostemon</i> , <i>DC.</i>	<i>Caryolopha</i> , <i>Fisch.</i>	<i>Gastrocotyle</i> , <i>Bnge.</i>
<i>Echioides</i> , <i>Desf.</i>	<i>Trachystemon</i> ,	<i>Pentaglottis</i> , <i>Tau</i>	<i>Taxostigma</i> , <i>A. R.</i>
<i>Onochilis</i> , <i>Mart.</i>	[<i>Don</i> ,	<i>Anchusa</i> , <i>L.</i>	<i>Moritzia</i> , <i>DC.</i>
<i>Lycopsis</i> , <i>Gärt.</i>	<i>Symphytum</i> , <i>L.</i>	<i>Buglossum</i> , <i>T.</i>	

TRIBE 4. *Lithospermææ*.—Nuts four, distinct, one-celled, closed, but not perforated at the base, inserted on the receptacle, and free from the style or gynobase. Corolla either naked, swollen, or furnished with arched processes.

GENERA AND SYNONYMES.

<i>Onosma</i> , <i>L.</i>	<i>Ægonychion</i> <i>Gry</i>	<i>Steenhammæra</i> ,	<i>Camptocarpus</i> ,
<i>Colmannia</i> , <i>Lehm.</i>	<i>Rhytospermum</i> ,	[<i>Reichb.</i>	[<i>C. Koch.</i>
<i>Macromeria</i> , <i>G. Don</i>	<i>Lk.</i>	<i>Pulmonaria</i> , <i>L.</i>	<i>Stenosolenium</i> <i>Trcz</i>
<i>Onosmodium</i> , <i>Mich.</i>	<i>Sericostoma</i> , <i>Stks.</i>	<i>Bessera</i> , <i>Sehl.</i>	<i>Meratia</i> , <i>DC.</i>
<i>Purshia</i> , <i>Sp.</i>	<i>Pentalophus</i> , <i>A. DC</i>	<i>Arnebia</i> , <i>Forsk.</i>	<i>Myosotis</i> , <i>L.</i>
<i>Osmodium</i> , <i>Raf.</i>	<i>Mertensia</i> , <i>Roth.</i>	<i>Dioclea</i> , <i>Sp.</i>	<i>Exarrhena</i> , <i>R. Br</i>
<i>Maharanga</i> , <i>A. DC.</i>	<i>Hyppoglossum</i> ,	<i>Meneghinia</i> <i>Endl</i>	<i>Strophostoma</i> ,
<i>Melkia</i> , <i>Lehm.</i>	[<i>Hartm.</i>	<i>Strobila</i> , <i>G. Don.</i>	[<i>Turcz.</i>
<i>Lithospermum</i> , <i>L.</i>	<i>Casselia</i> , <i>Dum.</i>	<i>Alkanna</i> , <i>Tausch.</i>	<i>Bothriospermum</i> ,
<i>Batschia</i> , <i>Gmel.</i>		<i>Baphorhiza</i> , <i>Link.</i>	[<i>Bunge.</i>

TRIBE 5. *Cynoglosseæ*.—Nuts four, distinct, often covered with prickles, or winged, closed, and not perforated at the base, obliquely inserted, and adhering more or less to the gynobase, and sometimes to the style. Corolla regular, furnished with arched processes, placed opposite the lobes, or rarely naked.

GENERA AND SYNONYMES.

<i>Amsinckia</i> , <i>Lehm.</i>	<i>Plagiobothrys</i> <i>Fsch</i>	<i>Cynoglossum</i> , <i>L.</i>	<i>Trichodesma</i> , <i>R. Br.</i>
<i>Benthamia</i> , <i>Endl</i>	<i>Krynitzkia</i> , <i>Fisch.</i>	<i>Omphalodes</i> , <i>T.</i>	<i>Pollichia</i> , <i>Med.</i>
<i>Gruvelia</i> , <i>A. DC.</i>	<i>Echinospermum</i> <i>Sw</i>	<i>Picotia</i> , <i>L. & S.</i>	<i>Leiocarya</i> , <i>Hechst.</i>
<i>Pectocarya</i> , <i>DC.</i>	<i>Lappula</i> , <i>Mön.</i>	<i>Suchtelenia</i> , <i>Car.</i>	<i>Streblanthera</i> , <i>St.</i>
<i>Ktenospermum</i> ,	<i>Rochelia</i> , <i>R. & S.</i>	<i>Solenanthus</i> , <i>Led.</i>	<i>Friedrichsthalia</i> ,
[<i>Lehm.</i>	<i>Hackelia</i> , <i>Opiz.</i>	<i>Diploloma</i> , <i>Schrk.</i>	[<i>Fenzl.</i>
<i>Antiphytum</i> , <i>A. DC</i>	<i>Heterocaryum</i> ,	<i>Caccinia</i> , <i>Savi.</i>	<i>Amsanthera</i> , <i>Raf</i>
<i>Eritrichium</i> , <i>Schrd.</i>	[<i>A. DC.</i>	<i>Mattia</i> , <i>Schultz.</i>	? <i>Craniospermum</i> ,
<i>Cryptantha</i> <i>Lehm</i>	<i>Asperugo</i> , <i>L.</i>	<i>Rindera</i> , <i>Pall.</i>	[<i>Lehm.</i>

TRIBE 6. *Rochellieæ*.—Ovary constant, with two one-celled, undivided, one-seeded carpels, adnate to the style.

GENERA AND SYNONYME.

Rochelia, *Reichb.*
Messerschmidtia, *Asso.*
 ? *Macielia*, *Vand.*

GEOGRAPHICAL DISTRIBUTION.—These are found in the temperate regions of the northern hemisphere, most abundantly in southern Europe,

the Levant, and Asia. They are not so frequent in North America, and they are unknown between the tropics.

PROPERTIES AND USES.—None of these plants possess any important properties. They contain a great quantity of mucilage, combined with a small portion of an astringent or bitter principle, which has been considered narcotic. Some are very mucilaginous, emollient, and diaphoretic, and contain a quantity of nitre. The bark of the roots of some species yields a colouring matter called alkanet.

Echium vulgare, or *Viper's Bugloss*, a common plant in Britain, is so called from the form of its seeds, the spots on its stem, which are compared to those of the viper, and its reputed properties of healing the bite of that reptile. The root is laxative, and slightly astringent; and that of *E. rubrum* furnishes a red colouring matter similar to alkanet. *Common Borage* (*Borago officinalis*) was formerly ranked among the four cordial flowers, along with Roses, Violets, and Alkanet, and enjoyed a high medicinal reputation. The whole plant is very succulent and mucilaginous, and is esteemed pectoral, emollient, and slightly sudorific; a decoction of the leaves and flowers is much used in France, even in the present day, for catarrh, eruptive diseases, and rheumatism. The distilled water, which has no virtues in it, is sometimes administered in cordial drinks, as a popular remedy. The most marked action of Borage is as a diuretic, on account of a considerable quantity of nitre it contains, and which causes a crackling noise when the plants are burned. The flowers are used to ornament salads, on account of their beautiful colour, and the fresh tops were formerly used in cool tankards. *Common Comfrey* (*Symphytum officinale*) was formerly regarded as a vulnerary, on account of its astringency, but it is not now used for that purpose. The roots, which are thick, succulent, sweetish to the taste, contain a very large quantity of tough, viscid mucilage, even more abundantly than the roots of marsh-mallow. Their decoction is esteemed in diarrhoea, dysentery, blennorrhagia, and pulmonary catarrh, not as an astringent, but as a corrector of irritation of the intestines and mucous membrane. It produces the same effect as marsh-mallow, linseed, psyllium, and other emollients, and possesses the same properties. It contains an active principle very similar to the malate acid of altheine. The young shoots, when blanched like celery, are eaten, and the young leaves may be used as spinach. *S. asperrimum* has, during the last seventy years, been alternately extolled and derided as a forage plant for cattle, the shoots and leaves of which they eat with great avidity. It was formerly called *Trottes*, but is now better known by the name of *Prickly Comfrey*. It produces, according to circumstances and skilful management, thirty to forty tons of green fodder annually, affording three cuttings, one in the middle of April, another in the middle of July, and a third in the middle of September. Pigs prefer it to vetches, and it is not dangerous, like clover, for cows or sheep; nor does it communicate any disagreeable flavour to the milk of cows. The crop is easy of cultivation, and remains many years in the soil.

Anchusa officinalis, or *Common Bugloss*, sometimes called *Ox-tongue*, grows plentifully in some parts of Britain, in waste places and way-sides, and formerly had great reputation as a cordial. According to Ch. Mayer, the inhabitants of Sturitzki hold it as an infallible remedy against madness.

A. italica is used in France for the same purposes, and has the same properties as Borage. Ehrenberg states that the Egyptians regard it as a specific against jaundice. *Alkanet* is a dye-drug obtained from several plants of this family, among which are *Lithospermum tinctorium*, *L. anchusoides*, *Echium rubrum*, and *Achusa virginica*; but that which supplies it in greatest quantity, and which is the true *Alkanet*, is *Achusa tinctoria*, a native of the Levant and the south of Europe. It is in the bark of the root that the colouring matter resides, and it is used extensively by dyers; by druggists, for colouring tinctures, salves, and plasters; by perfumers, for pomatums, oils, and washes; and by vintners, for colouring adulterated wines, of which spurious port contains a considerable quantity. *Lycopsis arvensis* was formerly supposed to act as a remedy against a carbuncle, by laying the bruised leaves on it; but its efficacy is very doubtful. The roots of *Onosma echinoides*, a native of the south of France, are reddish, and may be used as a dye, for which purpose they are sold in Provence as a kind of *Alkanet*. Pallas says, that in Siberia they furnish a sort of paint. Those of *Maharanga Emodi*, a native of Nepaul, is used as a material for dyeing blue, and is imported from Gosainsthan,—probably, also, from Thibet,—as a drug, under the native name of *Maharanga*, which signifies a strong, intense colour. *Mertensia maritima* is a native of the sandy sea-coasts of Scotland and the north of England, where it is called *Oyster Plant*, from its thick, succulent, oval leaves, which have quite the flavour of oysters. It is said that in some parts of Ireland it is eaten as a vegetable, and preserved in brine for use during the winter. *Pulmonaria officinalis*, or *Lung-wort*, is used in the north of Europe as a vegetable. It is mucilaginous, slightly astringent, and is regarded as emollient and pectoral. When burnt, it yields about the seventh of its weight in ashes, which are very bitter.

The lovely little *Forget-me-not* is *Myosotis palustris*, and may often be found growing in ditches and marshy places in many parts of Britain. *M. arvensis*, called *Scorpion grass*, or *Mouse-ear*, is abundant in corn-fields, and is used in Siberia against ophthalmia, in the form of cataplasms. *Cynoglossum officinale*, or *Hound's-tongue*, grows in some parts of Britain. The whole plant has a disagreeable odour, and some have ascribed to it noxious properties, while others regard it as perfectly harmless. The root, which is the part used, is regarded as anodyne, and even narcotic, and is prescribed in catarrh, hemorrhage of the lungs, and dysentery. It is also said to be destructive of animal poison, and of great utility against bites of serpents. Dr. Hagen states that the root, taken from a marshy soil, dried in the shade, and the powder taken in doses of ten grains, three times a day, cures the bite of a mad dog, the wound being at the same time washed with cold water, and covered with the powder of the root, over which a plaster of melilot is to be kept for ten days. This is a popular remedy in the government of Twer, in Russia, where Dr. Hagen resided for many years. Dr. Royle says the species of *Trichodesma* are diuretic, and are used against snake-bites in India.

The following order is, by De Cancellolle and some other botanists, combined with *Boragaceæ*; but, following Martius and Endlicher, we shall treat it as distinct.

ORDER, CXLI.—EHRETIACEÆ.—EHRETIA FAMILY.

The principal character which distinguishes this from the preceding order is its solid, four-celled ovary, terminal style, and berry-like, unopening fruit. The seeds are either with or without albumen.

TRIBE 1. *Tournefortiæ*.—Seeds with albumen.

GENERA AND SYNONYMES.

<i>Ehretia</i> , <i>L.</i>	<i>Carmona</i> , <i>Cav.</i>	<i>Cortesia</i> , <i>Cav.</i>	<i>Messerschmidtia</i> ,
<i>Beurreria</i> , <i>Jacq.</i>	<i>Halgania</i> , <i>Gaud.</i>	<i>Amerina</i> , <i>DC.</i>	[<i>L.</i>
<i>Bourreria</i> , <i>P.Br.</i>	<i>Menais</i> , <i>Léfl.</i>	<i>Tournefortia</i> , <i>L.</i>	<i>Arguzia</i> , <i>Amm.</i>
<i>Leutrostylis</i> , <i>G.D.</i>	<i>Rhabdia</i> , <i>Mart.</i>	<i>Pittonia</i> , <i>Pl.</i>	? <i>Rotula</i> , <i>Lour.</i>

TRIBE 2. *Heliotropæ*.—Seeds without albumen.

GENERA AND SYNONYMES.

<i>Heliotropium</i> , <i>T.</i>	<i>Odontotropium</i> ,	<i>Schobera</i> , <i>Scop.</i>	<i>Coldenia</i> , <i>L.</i>
<i>Piptoclaina</i> , <i>G.D.</i>	[<i>Griseb.</i>	<i>Schleidenia</i> , <i>Endl.</i>	<i>Tiquilia</i> , <i>Pers.</i>
<i>Gyrostachys</i> , <i>G.D.</i>	<i>Heliophytum</i> , <i>DC.</i>	<i>Preslea</i> , <i>Mart.</i>	<i>Pentacarya</i> , <i>DC.</i>
	<i>Tiaridium</i> , <i>Lehm.</i>	<i>Preslea</i> , <i>St. Hil.</i>	<i>Euploea</i> , <i>Nutt.</i>

These are principally natives of the tropics, but a few are found in the south of Europe, and in the warm parts of North America. In the West Indies, the berries of *Ehretia Beurreria* are eaten, and a decoction of the root of *E. buxifolia*, a native of the East Indies, is useful in syphilis and eahexy, and the native physicians regard it as an antidote to vegetable poisons. The fruit of *E. tinifolia* are eatable. *Tournefortia hirsutissima* is used in the West Indies in the form of a cataplasm, to destroy the chiques which penetrate the skin; the root is regarded as diuretic, and the whole plant is esteemed against rheumatism. *T. umbellata* is an astringent, and is considered in Mexico to be useful as a febrifuge. The *Heliotrope*, or, as it is sometimes called, *Apple-pie* (*Heliotropium peruvianum*), is a well-known fragrant plant. *Heliohytum indicum* is said to be astringent, and to be used to cleanse ulcers and allay inflammation. *Coldenia procumbens* is used in India, along with fenugree in powder, against whitlow, which it speedily brings to suppuration.

The next small family is included by De Candolle as a tribe of Solanaceæ; but many eminent botanists, among whom are Richard, Endlicher, Ad. Brongniart, and Von Martius, regard it as distinct.

ORDER CXIII.—NOLANACEÆ.—NOLANA FAMILY.

THIS order differs from Solanaceæ in its numerous ovaries, which are one to six-celled; or two two-celled ovaries united in one. Embryo curved round the albumen, semicircular, circular, or spiral.

GENERA AND SYNONYMES.

<i>Nolana</i> , <i>L.</i>	„ <i>Teganium</i> ,	<i>Alona</i> , <i>Lindl.</i>	<i>Bargmontia</i> , <i>Gaud.</i>
<i>Walkeria</i> , <i>Ehret.</i>	[<i>Schmidt.</i>	<i>Lolia</i> , <i>Lindl.</i>	<i>Grabowskia</i> ,
<i>Zwingeria</i> , <i>Hofser.</i>	<i>Neudoifia</i> , <i>Ad.</i>	<i>Alibrexia</i> , <i>Miers.</i>	[<i>Schlecht.</i>
	<i>Sorema</i> , <i>Lindl.</i>	<i>Aplocarya</i> , <i>Lindl.</i>	

The whole of the species are natives of South America.

ORDER CXLIII.—SOLANACEÆ.—NIGHTSHADES.

HERBS, shrubs, and small trees, sometimes spiny. *Leaves* simple,



Fig. 172. *Physoclaina grandiflora*. A, Capsule of *Nicotiana tabacum*; B, section of ditto; C, capsule of *Hyoscyamus niger*; D, embryo of *Solanum*.

or divided, alternate, or sometimes in pairs towards the upper parts of the branches. *Flowers* hermaphrodite, regular, occasionally somewhat unequal. *Calyx* permanent, with five more or less deep divisions. *Corolla* very varied in form, having five, rarely four lobes, which are more or less deeply

plaited the one on the other. *Stamens* equal in number to the lobes of the corolla, and alternating with them; *filaments* free, rarely united in a bundle at the base. *Ovary* seated on a hypogynous disk, generally with two, rarely three or four many-

ovuled cells, attached to the inner angle. *Style* simple, terminated by a two-lobed stigma. *Fruit* either a capsule, with two or four many-seeded cells, opening in two or four valves, with a double partition parallel with the valves; or a berry, with two or three cells, having the seed-bearers adhering to the partition. *Seeds* numerous, kidney-shaped, sessile. *Embryo* curved or straight, in the midst of fleshy albumen, with the radicle near the sub-marginal hilum.

TRIBE 1. *Triguereæ*.—Corolla irregular, somewhat two-lipped, and bell-shaped. Filaments, membranaceous, united at the base. Fruit not succulent, somewhat globose, membranaceous, unopening, two-celled, valveless. Seed-bearers central, united together. Embryo spirally convolute, with semicylindrical seed-lobes.

GENUS.

Triguera, Cav.

TRIBE 2. *Solanææ*.—Corolla regular. Berry two-celled (rarely one, three, or four-celled). Embryo curved, semicircular, circular, or spiral.

SUB-TRIBE 1. *SOLANIDÆ*.—Corolla rotate, globose, or widely bell-shaped, with a short tube.

GENERA AND SYNONYMES.

Lycopersicum, T.	Ceranthera, Raf.	Aureliana, Sendt.	Physalis, Bern.
Solanum, L.	Cyphomandra Mart	Capsicum, T.	Pentaphiltrum,
Melongena, T.	Cyathostyles,	Saracha, R. & P	[Rehb.
Pseudocapsicum,	[Schott.	Bellinia, R. & S.	Alkekengi, T.
[Mön.	Pionandra, Mrs.	Nicandra, Ad.	Margaranthus.
Dulcamara, Mön.	Pallavicinia, Not.	Calydermos, R&P	[Schl.
Aquartia, Jacq.	Witheringia, Herit.	Physalis, L.	Withania, Dunal.
Nycterium, Vent.	Brachistus, Miers.	Herschelia, Bowd	Hypnoticum, Rod
Androcera, Nutt.	Bassovia, Aub.	Cacabus, Bern.	Puneria, Stks.

SUB-TRIBE 2. *ATROPIDÆ*.—Calyx mostly five- parted, rarely five-cleft. Corolla bell-shaped, tubular, or funnel-shaped, with a valvate-plaited æstivation. Ovary globose or ovate.

GENERA AND SYNONYMES.

Atropa, L.	Salpichroma, Miers.	Phrodus, Miers.	Discopodium. Hoch.
Belladonna, T.	Salpichroa, Miers	Lonchestigma, Dun	Himeranthus, Endl.
Mandragora, T.	Planchonia, Dun	Dorystigma, Mrs.	Nectouxia, H. B.K.
Trechonetes, Miers	Busbeckia, Mart.	Hilsenbergia, Tau.	Jaborosa, Lam.
Hebecladus, Miers.	Perizonia, Miers.		

SUB-TRIBE 3. *LYCIEÆ*.—Calyx five, rarely four or six toothed, never five-cleft. Corolla tubular, tubular-funnel-shaped, or funnel-bell-shaped; æstivation valvate or imbricate.

GENERA AND SYNONYMES.

Codochnonia, Dunal.	Anisodontus, G.D	Acnistus, Schott.	Laureria, Schl.
Thinogeton, Benth.	Iochroma, Benth.	Sieklera, Sendt.	Sarcophysa, Mrs.
Dunalia, H. B. K.	Cleochnoma, Mrs	Fregirardia, Dun.	Ulloa, Pers.
Dierbachia, Sp.	Lycioplesium, Mrs.	Lycium, L.	Markea, L. C. R.
Chænesthes, Miers.	Pœcilochnoma, Mrs	Juanulloa, R. & P.	Lamarkea, Pers.

TRIBE 3. *Datureæ*.—Embryo more or less arched; cotyledons semi-cylindrical. Capsule or berry imperfectly four-celled, with the primary partition in the middle, or near the marginal angle, with the seed-bearers on both sides.

GENERA AND SYNONYMES.

Solandra, Swz	Ectozoma, Miers.	" Stramonium, T.	Ceratocaulos,
Swartzia, Gm.	Dictyocalyx, Hook.f	Dutra, Bernh.	[Spach
Dyssochnoma, Miers	Datura, L.		Brugmansia Pers

TRIBE 4. *Hyoscyamææ*.—Embryo more or less arched; seed-lobes semi-cylindrical. Capsule two-celled, opening transversely.

GENERA AND SYNONYMES.

Hysceyamus, *T.* | „ *Seopolina*, *R. & S.* | „ *Physoclaina*, *G.D.* | „ *Belenia*, *Dcne.*
Seopolia, *Jacq.* | *Anisodus*, *Link.* | *Whitleya*, *Sweet.* |

TRIBE 5. *Nicotianæ*.—Embryo almost straight, or slightly arched, somewhat cylindrical, with short, club-shaped seed-lobes. Capsule two-celled, with the valves ultimately free from the partition. Ovary sessile, generally girded at the base with a hypogynous disk. Stigma capitate, two-lobed.

GENERA AND SYNONYMES.

Nicotiana, *T.* | *Codylis*, *Raf.* | *Nicotiana*, *R. & P.* | *Leptophragma*,
Nyctagella, *Rch.* | *Sairanthus*, *G.D.* | *Petunia*, *Juss.* | [*Bnth.*
Tabacum, *Rch.* | *Polydielis*, *Micr.* | *Callibrachoa*, *Ll.* | *Vestia*, *W.*
Tabacina, *Rch.* | *Lehmannia*, *Sp.* |

TRIBE 6. *Retziæ*.—Calyx five-lobed, regular or irregular. Corolla tubular, regular. Ovary smooth, oblong, or ovoid. Style simple, with an obtuse somewhat two-lobed stigma, or two styles (united at the base?), with very small obtuse stigmas. Capsule few-seeded.

GENERA AND SYNONYME.

Lonchostoma, *Wikstr.*
Retzia, *Th.*
Solenostigma, *Klotzsch.*

TRIBE 7. *Fabianæ*.—Embryo almost straight, somewhat cylindrical, with compressed seed-lobes. Capsule two-celled, with the valves ultimately free from the partition. Ovary stipitate. Stigma two-plated.

GENERA.

Nierembergia, *R. & P.* | *Bouchetia*, *DC.* | *Fabiana*, *R. & P.*

TRIBE 8. *Metternichieæ*.—Embryo elongated, perfectly straight, cylindrical. Capsule two-celled, with half-opening valves. Seeds few, three-sided, fixed to the bottom of the partition by a basilar hilum.

GENERA AND SYNONYME.

Metternichia, *Mikan.*
Lisianthus, *Vell.*
Sessea, *Ruiz. & Pav.*

TRIBE 9. *Cestreæ*.—Embryo almost straight, somewhat cylindrical, with small, ovate, compressed seed-lobes. Ovary stipitate. Fruit a berry, two-celled, few-seeded. Seeds angular, suspended from the middle of the partition by a ventral hilum.

GENERA AND SYNONYMES.

Cestrum, *L.* | *Habrothamnus*, | *Cliocarpus*, *Micr.* | *Perlarius*, *Rumph.*
Meyenia, *Schlecht* | [*Endl.* | ? *Cotylanthera*, *Bl.* | ? *Desfontainia*, *R. & P.*
| *Aeocanthera*, *G.D.* | ? *Dartus*, *Lour.* | *Linkia*, *Pers.*

GEOGRAPHICAL DISTRIBUTION.—The greater number inhabit the tropics, and the remainder are distributed over the temperate regions of both hemispheres, but do not extend to the arctic and antarctic zones.

PROPERTIES AND USES.—The whole family is suspicious, a great part are narcotic, and many are deleterious. The roots partake of the properties of the plants, and are sometimes even more active. The tubercles of such as produce them are amylaceous and nutritive, as in those of the potato. The leaves are generally narcotic, but they lose this principle in boiling, as is the case with *Solanum nigrum*, which are used as a vegetable when cooked. The fruit present very varied and anomalous characters. Those which are red or yellow are acid and eatable, as the alkekengi, tomato, and capsicum; those which are black or purple are deleterious, as the mandrake, belladonna, thorn-apple, henbane, cestrum, &c. The marked principle of the Nightshades is an acrid narcotic. It produces stupefaction, cerebral excitement, derangement of the senses, mental aberration, diminished circulation, and death.

The *Love-apple*, or *Tomato* (*Lycopersicum esculentum*), is a native of Mexico and South America, but is also found in the East Indies, where it is supposed to have been introduced by the Spaniards. The Malay name is *Tamatte*; and in Mexico it is called *Tamalt*. The whole plant has a disagreeable, acrid, and nauseous odour; and its juice inspissated over the fire emits a vapour so powerful as to cause vertigo and vomiting. The fruit, which is the only part used as an esculent, are extensively used in Spain, Italy, and France, in soups, sauces, and pickles; and even in their natural state they have an agreeable acid flavour. In our own country, the cultivation of Love-apples is becoming much greater than formerly, and the more the community becomes acquainted with the many agreeable forms in which the fruit can be prepared, the wider will the cultivation be extended. For soups, sauces, ketchup, preserves, and confectionery, they are equally applicable, and the unripe fruit makes one of the best of pickles. By analysis, the fruit of the Love-apple has been found to contain a particular acid; a volatile oil; a brown, very fragrant, extracto-resinous matter; a vegeto-mineral matter; mucosaccharine, some salts, and in all probability an alkaloid. There are several varieties of the Love-apple, distinguished by different shades of colour between red and yellow.

The uses of the *Potato* are too well known to require any special notice, but the plant was a long time in this country before its alimentary properties were fully appreciated. So long ago as 1586, the Potato was introduced by Sir Walter Raleigh, from Virginia, into Ireland, where, on his estate at Youghall, near Cork, it was cultivated and its value appreciated long before any notice was taken of it, or its existence was known on this side of the channel. But it was not till the middle of the last century that their cultivation actually became a subject of interest, and they were not cultivated as a field crop till about the year 1760. According to Humboldt, the native country of the Potato, like that of wheat and Indian corn, is unknown, it never having been found in a wild state even in those parts where it is said to be indigenous. Even at Quito, in the Cordilleras, it is only known in a state of cultivation. But Paven, one of the authors of the "*Flora Peruviana*," is said to have found it, at the very time Humboldt made that statement, growing wild in the neighbourhood of Lima. It has also been found in Mexico, with tubers not larger than a filbert.

Next to the cereals, the potato is the most valuable plant for the production of human food. Its tubers, according to analysis conducted by Mr.

Fromberg in the laboratory of the Agricultural Chemical Association of Scotland, contains the following ingredients:—In its fresh state the tuber consists of 75·52 per cent. of water; 15·72 of starch; 0·55 of dextrine; 3·3 of impure saccharine matter; 1·41 of casein, gluten, and albumen; 0·24 of fatty matter, and 3·25 of fibre with coagulated albumen. In a dried state, the tuber contains 64·2 per cent. of starch; 2·25 of dextrine; 13·47 of impure saccharine matter; 5·77 of casein, gluten, and albumen; 1 of fatty matter, and 13·31 of fibre with coagulated albumen. The ash, or inorganic portion, amounts in the fresh tuber to 0·87, and in the dry to 3·57; and this comprises 43·18 of potash; 3·2 of soda; 1·8 of lime; 3·17 of magnesia; 0·14 of oxide of iron; 5·24 of sulphuric acid; 8·61 of phosphoric acid; 4·81 of chlorino; 1·94 of silica; and 18·29 of carbonic acid. The fecula called *potato starch* has a beautiful white crystalline appearance, inodorous, soft to the touch, insoluble in cold, but very soluble in boiling water. It is on this starch that the nutritive properties of the tubers depend. As an aliment, it is well adapted for invalids and persons of delicate constitution. It may be used in the form of arrow-root, and eaten with milk or sugar; for pastry of all kinds, it is more light and easier of digestion than that made with flour of wheat; in confectionery it serves to form creams and jellies, and in cookery may be used to thicken soups and sauces. This starch accommodates itself to the stomach and chest; for children particularly it is well adapted; and it is an aliment which cannot be too generally used, as much on account of its wholesomeness as its cheapness and the ease with which it is kept, which are equal, if not superior, to all the much-vaunted exotic feculæ, as salep, tapioca, sago, and arrow-root. Potato starch, mixed with ground coffee and olive oil in the consistence of a cake, has been highly spoken of as furnishing a beverage more agreeable than that usually made from pure coffee; and a sort of chocolate is made in the same way by substituting cacao for coffee. It is also converted into starch for laundry purposes, and is used for hair powder. It absorbs nearly half its weight of water. From this starch a substance is obtained, called *dextrine*, resembling gum in its appearance and properties, but differs from it in not affording mucic acid by the action of nitric acid; it is largely dissolved by hot or cold water, and forms a mucilaginous solution from which it is precipitated by alcohol, but that fluid has no action upon it. Dextrine is now largely prepared in this country for various uses in the arts, and is known by the name of *artificial gum*. It is distinguished from natural gum by the taste and smell of potato oil, which it always possesses. The water in which potato pulp has been washed, to obtain the starch, contains coloured albumen; citrate of chalk; asparagin; a bitter, aromatic, crystalline resin; phosphate of potash and chalk; citrate of potash and crystallisable citric acid; and a particular animal matter.

A sugary principle found in the tubers of potatoes, called *potato sugar*, is obtained in the form of syrup or treacle, and has not yet been crystallised. It resembles the sugar of grapes, has a very sweet taste, and may be used for making sweetmeats, and as a substitute for honey; sixty pounds of potatoes, yielding eight pounds of dry starch, will produce seven-and-a-half pounds of sugar. In Russia it is extensively made, as good, though of less consistency, than the treacle obtained from cane sugar. A spirit is also distilled from the tubers which resembles brandy, but milder, and has a

flavour as if it were charged with the odour of raspberries or violets. In France this manufacture is carried on pretty extensively, and five hundred pounds of the tubers will produce twelve quarts of spirit, the pulp or marc being given to cattle. From this spirit, or alcohol of potatoes, a colourless, limpid liquid is obtained, having a strong smell, and a hot, acrid taste; this is *potato oil*. It burns without smoke, but requires to be heated, in order to continue burning. In some parts beer is made from potatoes, by boiling them, adding a proportion of steeped malt, and passing the whole through the ordinary process of fermentation. Vinegar may also be obtained from the tubers, though never of good quality; but it is used for some purposes in the arts. Potatoes, boiled and beaten along with sour milk, form a sort of cheese, which is made in Saxony, and, when kept in close vessels, may be preserved for several years. It is generally supposed that the water in which potatoes are boiled is injurious, and, as instances are recorded where cattle, having drank it, were seriously affected, it may be well to err on the safe side, and avoid its use for any alimentary purpose. Potatoes which have been exposed to the air, and become green, are very unwholesome. Cadet de Vaux asserts that potatoes will clean linen as well as soap, and we know that the berries of *S. saponaceum* are used in Peru for the same purpose.

The haulm of the potato is eaten by cattle, and it is said that paper has been made from it. From the leaves an extract is prepared which is a powerful narcotic, serviceable in chronic rheumatism and painful affections of the stomach and uterus. The flowers yield a brilliant yellow colour. The fruits are sweetish to the taste, and nauseous when fermented; and distilled they yield a spirit in the proportion of one twenty-fourth of the berries. *S. Valenzuela* also produces tubers, which are used in soups in New Grenada, but they never attain to any size.

The *Egg-plant*, *Mad-apple*, or *Jew's-apple* (*Solanum esculentum*) is a native of the East Indies. It produces large, oval-shaped fruit, the size and form of a hen's-egg, generally of a pure white colour, but sometimes with a violet tinge. These fruits are used in some parts of the south of Europe, either raw or cooked in various ways. Thunberg says that in India they are cooked in soups or in wine, and are regarded as diuretic and lithontriptic. Dombey asserts that in Peru, if eaten in excess, they have an injurious effect. *S. sodomium*, or *Apple of Sodom*, is a native of the north of Africa and south of Europe, but is now found at the Cape of Good Hope and in Australia. The fruit is the size of an apple when ripe, and contains a greenish pulp, which, if eaten, produces headache, heaviness, madness, and death. The roots, which are acrid and almost bitter, are used in decoction by the Hottentots against dropsy. *S. quitoense* is called by the Spaniards *Quito Oranges*, because of their size and appearance. They have also the flavour of oranges, and a little of the juice is used in the tea called *maté*. It is cultivated in gardens at Lima. That of *S. æthiopica* is used in the same way as we do Tomatoes; but that of *S. fuscum*, although it belongs to the same section as these, is poisonous. The fruit of *S. muricata* has the flavour of a melon, and is eaten in Peru. *Common Nightshade*, or *Solanum nigrum*, a common weed in gardens and cultivated grounds, is generally regarded with suspicion; but M. Dunal, of Montpeltier, asserts that he has frequently administered the berries without any serious results; and if any

deleterious principle resides in the leaves, it must be destroyed by boiling them, as they are, in many parts of the world, used as spinach. The whole plant has an insipid, cooling taste, and is certainly slightly stupefying and narcotic; some authors regard it as stimulant. The leaves, in a fresh state, are injurious, and it is recorded that a flock of sheep were completely destroyed by eating them during a warm season. They are sometimes applied to wounds, ulcers, and hemorrhoids, and in decoction are employed to wash inflamed, swollen, and irritated parts. In Brazil they are used in the form of a hot cataplasm, applied to the bladder in cases of spasmodic retention of the urine. The fruit is reported to be the most dangerous part of the plant, and yet it appears that they are eaten in the Ukraine without any dangerous result; in the island of Ascension they are used for "plum-pudding" for the garrison; and M. Guerin states that he has taken fifteen of the berries without inconvenience. From the berries, M. Desfosses, of Besançon, obtained an alkaloid which he called *Solanine*, and on this the active principle of the plant depends. It is a white, opaque powder, slightly bitter and nauseous; acrid in the throat; fusible; soluble with difficulty in water and the oils; slightly soluble in ether, and very soluble in alcohol; forming with the acids uncrystallisable, bitter salts, of a gummy appearance. It is also found in the following species, and in the young shoots of the potato.

Bitter-sweet, or Woody Nightshade (S. dulcamara), is found abundantly in hedges and among bushes in Britain, where it may be seen in autumn forming festoons of its bunches of beautiful scarlet berries. These berries were at one time considered injurious, but some authors assert that they are quite innocuous, still we are inclined to regard them with suspicion. The plant is possessed of feeble narcotic properties, and does not produce the effect which such agents have on the animal system, unless taken in very large doses; and then it causes nausea, vomiting, faintness, vertigo, and convulsive muscular movements. *Dulcamara* has been recommended in the treatment of cutaneous eruptions, particularly those of a scaly nature. Besides *solanine*, the stalks of the plant yield a peculiar principle called *piroglycion*, a vegeto-animal substance, gummy extractive, gluten, green wax, resin, benzoic acid, starch, lignin, and various salts of lime. The fruit of *S. laciniatum* is called *Kangaroo-apple*, and is a common food among the natives of Van Dieman's Land; when perfectly ripe, it may be eaten in any quantity with impunity; but when unripe, is acrid, and produces a burning sensation in the throat. *S. mammosum* is a native of the West Indies, and produces a fruit the size of an apple, which is very narcotic, and injurious in a high degree. The root of *S. manosum*, an Indian species, is bitter, and its decoction is regarded as an excellent diuretic. The juice, mixed with sugar, is given in consumption. The bark of *S. pseudo quina* is used in Brazil against intermittent fevers, as a substitute for cinchona, and the leaves of *S. crispum* are employed for the same purpose. The fruit of *S. torvum* is used in the West Indies in the composition of an oil against rheumatism, and in the East Indies the root, in decoction, is recommended in dysuria and ischuria. The juice of the berries of *S. bahamense* is employed in the West Indies in inflammation of the throat. With the juice of the berries of *S. carolinense*, M. Valentin cured a case of non-traumatic tetanus, by administering the produce of five or six berries daily, and increasing to that of eight or ten during the

treatment. *S. cernuum* is employed as a sudorific in Brazil; and the juice of the berries of *S. chenopodioides* is employed in Chili against diseases of the eyes; it is also prescribed, mixed with alum, rose-water, and the yolk of eggs, in hemorrhoids and falling of the anus. With the berries of *S. coagulans* the Egyptians curdle milk. *S. Jacquini*, an Indian species, is considered emollient, tonic, and stomachic, and, according to Ainslie, the fruit and the root are regarded as expectorant, and are prescribed in diseases of the chest, and humid asthma. The leaves of *S. oleraceum* are eaten as a vegetable in Guiana, as are those of *S. sessilifolium* in Brazil. The juice of the leaves and ripe fruit of *S. paniculatum* is highly esteemed in the West Indies in abdominal obstructions, particularly those of the liver, and in catarrh of the bladder; the fresh leaves are applied to wounds. With the flowers of *S. pressum*, mixed with other substances, the natives of Amboyna dye their teeth red. The fruit of *S. pseudo-capsicum* has been supposed to be deleterious, but M. Dunal says they are not so, for a dog which swallowed thirty of them, cut in pieces, sustained no injury. The natives of Guiana use *S. toxicarium* as a poison. The root of *S. undatum* bruised and drank in wine, in doses of two ounces, is employed in Madagascar as a purgative; in smaller quantity it checks vomiting. Its decoction, mixed with honey, is used in fevers, to assist digestion, and as a peccoral. M. Chevalier is said to have found in *S. verbasifolium* a substance analogous to morphine. In the Canary Islands the women paint their cheeks with the berries of *S. vespertilio*.

From the pods of *Capsicum annum*, or *Guinea Pepper*, the substance known as *Cayenne Pepper* is derived. It is, in fact, merely these pods reduced to powder, in a mortar or by any other process. It is well known by its bitter, acrid, pungent taste, and this depends upon a peculiar principle, discovered by Braconnot, and named *capsicin*, which is similar to an oil or soft resin, of a yellowish-brown colour, and when tasted, though at first balsamic, soon produces an insupportable, hot, and pungent sensation over the whole interior of the mouth. Red oxide of lead is frequently added to the pounded capsicum to heighten the colour, and it is therefore more safe to procure the pods and pound them as they are required for use. Capsicum is useful in enfeebled or languid action of the stomach; but its most important medical application is in malignant sore throat and scarlet fever, in which it is used both internally and as a gargle. The *Winter Cherry* (*Physalis alkekengi*) is a perennial herbaceous plant, often found in gardens, producing round red berries like cherries, having an acidulous, slightly bitter, and not unpleasant flavour. They are chiefly recommended as a diuretic, but in America they are commonly eaten to quench thirst, and in Germany, Switzerland, and Spain, they are served at the table as dessert, along with other fruits. The fruit of *P. pubescens*, a native of North America, is eatable, and made into confections. It is now naturalised in Italy, where it is cultivated in gardens, and highly esteemed for its sweet acidulous berries. The fruit of *Withania somnifera* is considered in India deobstruent and diuretic, in decoction; it is also alexipharmic. The leaves, steeped in a little castor oil, are applied internally to inflamed tumours.

One of the most deleterious plants of the family is *Atropa belladonna*, or *Deadly Nightshade*. It grows in Britain, but not abundantly, and is generally found about old walls and ruins, in the neighbourhood of towns.

The berries are black, of the size of a small cherry, with a longitudinal furrow on each side, and are decidedly poisonous. The whole plant is a powerful narcotic, and numerous instances are on record of poisoning occasioned by the use of it. The active properties have been found to reside in a peculiar principle, called *Atropin*, which is in the form of white, silky crystals, inodorous, and with a bitter taste. The leaves of *Belladonna* applied to the eye paralyzes the iris, and dilates the pupil; they are useful in cancer or serofula, either applied as poultices or sprinkled over the sores; taken internally, they act as a narcotic, diaphoretic, diuretic, and sialogogue. The juice of the berries, used as a cosmetic, make the cheeks pale. The *Common Mandrake* (*Mandragora officinarum*) also possesses narcotic properties, but one or two of its fruit may be eaten without inconvenience. The roots, which are like those of a large beet, are supposed to bear a resemblance to the human form, and are figured as such in old herbals, being distinguished into the male with a long beard, and the female with long hair. Strange superstitions have existed in connection with this root. It was supposed to cause amorous desires, to cure barrenness, to produce happiness, and finally to procure wealth. It was employed by magicians in their incantations, and, by being made to assume the human form, was used to deceive the ignorant. One of the popular fables was, that it grew under a gallows or gibbet, and the matter falling from the decaying dead body, gave the root the shape of a man. When taken up it was said to utter a shriek and groans, and it was customary to tie some animal to it for that purpose, because if done by a man he would surely die in consequence! In South America *Himeranthus runcinatus* has the same properties and reputation.

Thorn Apple, or *Stramonium* (*Datura stramonium*), is another of the acrid narcotics belonging to this family, and appears to exercise the same influence on the animal economy as *Belladonna*. It is sometimes found wild in Britain, having escaped from the gardens, and its habitat is generally among rubbish and on dunghills. It is easily known by its large oval seed-vessels, thickly covered over with stout sharp spines. The whole plant has a disagreeable, nauseous, and heavy odour, particularly when bruised, and an acrid, bitter taste. It loses much of its odour by drying, but retains its properties. When taken internally, in moderate doses, it causes numbness, vertigo, dimness of vision, dilation of the pupils, produces a slight delirium, intoxication, and forgetfulness, and these effects pass off in five or six hours; but if the quantity taken be large, then all the symptoms of poisoning are presented, as heartburn, intense thirst, a feeling of strangulation, delirium, madness, convulsive movements, and paralysis; congestion of the brain ensues, symptoms of inflammation are manifested, and death follows in twelve or fifteen hours. M. Orfila states that *Stramonium* acts with more force on the brain than *Belladonna*, and produces more furious delirium. *Stramonium*, smoked like tobacco, is a popular remedy for the cure of asthma. Its use in this way has been derived from the East Indies, where other species are used for this purpose. It is the root and lower parts of the stem which are so employed, and the smoke excites a sense of heat in the chest, followed by copious expectoration, and sometimes attended with temporary vertigo and drowsiness. The seeds have the same nauseous, bitter taste as the leaves, and in them Brandes discovered an alkaline prin-

eiple, called *Datura*, combined with an excess of malic acid. It is in the form of colourless crystals, inodorous, and when first applied to the tongue is bitterish, but afterwards of the taste of tobacco; its action is poisonous. When judiciously administered, Stramonium is highly valuable in mania, epilepsy, convulsions, tic-douloureux, chronic rheumatism, and hydrophobia. The properties of *D. tatula* are of a similar kind, as are also these of *D. ceratacaulon*, and *D. fastuosa*.

Henbane (*Hyoscyamus niger*) is another of these very dangerous narcotics. It is a native of Britain, and may be met with among rubbish and on dunghills. The whole plant has a rank, offensive odour, and possesses in all its parts the same acrid narcotic properties as stramonium and belladonna. Wepfer relates that the whole inmates of a convent were poisoned by using the root instead of chicory. The root is emetic, and necklaces are sometimes made of it to cure convulsions in children; they are biennial, and are more energetic in their action the second year than the first. The leaves have a fetid and narcotic odour, like that of tobacco; their taste is mucilaginous and slightly acrid; when dried, they have little flavour or smell; and when thrown on the fire, they burn with a crackling noise, as if they contained nitre. Applied to the head in a fresh state, they allay nervous headache. Boiled with milk, and applied to the breasts, they dissipate induration of the milk; they are also used in gouty tumours, rheumatism, and to allay pain. The seeds possess all the properties of the plant. Smoked through a pipe, like tobacco, they have been found beneficial in toothache. They contain an alkaline principle, called *hyoscyamin*, combined with malic acid. It is in the form of transparent, colourless, needle-shaped crystals, without odour, and with a disagreeable taste. Henbane, in the hands of the professional practitioner, acts as a diaphoretic or diuretic, as an anodyne and soporific. It is generally used to relieve pain, procure sleep, or quiet irregular nervous action; but as such it is inferior to opium, although it has this advantage in certain cases, that it has no tendency to produce constipation. Neuralgic and spasmodic affections, rheumatism, gout, hysteria, and various pectoral diseases, as catarrh, asthma, and pulmonary consumption, are among those in which it is most frequently prescribed. The seeds of *Scopolia nutica*, a native of Arabia, after being roasted and infused, form a drink used by some nations in Asia. They are often given to children in Egypt, where they are called *birz-bind*, as a cordial; the men use them to produce those mental reveries and excitement so much enjoyed by Orientals.

Tobacco, which has now become almost a necessity to nearly every nation of the globe, is *Nicotiana tabacum*, a native of tropical America, but now cultivated, as an important article of commerce, in all countries where the climate is sufficiently warm to bring it to maturity. The great centre of commercial production is the southern states of North America, and particularly Virginia, but it is not grown north of Maryland. In many parts of central and southern Europe, it forms an important crop; it is cultivated, by the natives of Africa, from the Mediterranean to the Cape of Good Hope; it is met with all over Asia and the islands of the Indian Archipelago, Australia, and Polynesia, and it would be difficult indeed to find a spot where it is not. Strango that a stinking, repugnant herb, smoked by savages in the wilds of central America, should have spread so rapidly, not

only over the civilised world, but even among nations farthest removed from civilisation—that it should have become the source of immense revenue to powerful governments, and operated in some degree even on the manners and customs of the peoples. Imported from America soon after the discovery of that continent, it was received into the Old World with a species of enthusiasm, and Europeans, Asiatics, and Africans, began to smoke, to chew, and to snuff. It was not long, however, before inconveniences involved in the practice began to appear, and a host of enemies were raised up against it. Theologians pronounced it an invention of Satan which destroyed the efficacy of fasting—a point much disputed in the sixteenth and seventeenth centuries. Councils forbade it to all ecclesiastics under their control. Popes Urban VIII. and Innocent XI. punished the use of it with excommunication, Sultan Amuret IV. with the most cruel kinds of death, and Schah Abbas II. with penalties almost as severe. Michael Feodorovitch Touriëff ordered a bastinado for the first offence, cutting off the nose for the second, and the head for the third. Prussia and Denmark simply prohibited, and James I. of England wrote against it. Finding no penalties, however severe, could check indulgence in this luxury, sovereigns and their governments soon found it much more advantageous to turn it into a source of revenue; and the cultivation and manufacture of tobacco was gradually subjected, almost everywhere, to fiscal regulations, restrictions, or monopolies, which still prevail in various forms over the greater part of Europe.

Tobacco may be grown perfectly well in this country, and in Ireland its cultivation might be made a source of national industry; but the fiscal restrictions are such, that not more than half a pole can be grown by any one person. The seed is sown on a hot-bed in the beginning of April, and when the plants have got four or six leaves, prick them out on a bed prepared for them, where they remain till they produce leaves about three inches long, and then they may be removed to where they are to remain. The ground is planted in rows three feet apart, and the plants are two feet and a half distant from each other in the rows. During the period of growth, the ground must be kept well hoed and stirred. As soon as the flowers begin to show colour, break off the head of the plant and the small top leaves; this will induce in a short time the production of side shoots, which must be removed as soon as they appear, and the whole vigour of the plant will be directed towards the leaves. In America, when the leaves begin to assume a yellow colour, or are marked with yellow blotches, the plants are carefully cut down so as not to break or injure the leaves, and hung up in a large barn to dry; but in this country, where the leaves are not all matured at the same time, they are to be gathered as they become yellow, tied together in small bunches, and hung up in some shady, airy place to dry. After they have become thoroughly dried and crisp, watch the first opportunity of a humid state of the atmosphere, which will cause them to become soft, and then pack them evenly in a box with the butts all one way, press them moderately, and a slight fermentation will shortly take place. All that is necessary is, that a slight warmth be generated; then open it all, shake the bunches in the air to let off the heat, and repack it lightly; when all appearance of fermentation is over it may be stored as tight as possible in a barrel, and kept for use.

Tobacco is a sedative narcotic, combining also emetic and diuretic properties. Snuffed up the nostrils, it causes sneezing and a copious secretion of mucus; when chewed or smoked it excites the salivary glands, and when injected into the rectum it acts as a cathartic. When taken in moderation it quiets restlessness, allays mental or bodily inquietude, and produces a state of general languor and repose; but in larger doses it causes vertigo, stupor, faintness, nausea, vomiting, and general debility of the nervous and circulatory functions. The active properties of tobacco seem to reside in a peculiar principle called *nicotin*, or *nicotia*, an acrid, volatile, colourless liquid, soluble in water, alcohol, ether, and oil of turpentine. In its action on the animal system it is one of the most virulent poisons known. A drop of it in the state of concentrated solution was sufficient to destroy a dog, and small birds perished at the approach of a tube containing it. There is also another substance, which appears to be the odorous principle of tobacco, called *Nicotianin*. It is of a fatty nature, having the smell of tobacco-smoke, and an aromatic, somewhat bitter taste. It produces sneezing when applied to the nostrils, and a grain of it swallowed by Hermstadt caused giddiness and nausea. By analysis, chemists have found 10,000 parts of the fresh leaves of tobacco to contain 6 of nicotin; 1 of nicotianin; 287 of slightly bitter extractive; 174 of gum mixed with a little malate of lime; 26.7 of green resin; 26 of albumen; 104.8 of a substance analogous to gluten; 51 of malic acid; 12 of malate of ammonia; 4.8 of sulphate of potassa; 6.3 of chloride of potassium; 9.5 of potassa, which was combined in the leaves with malic and nitric acids; 16.6 of phosphate of lime; 24.2 of lime, which has been combined with malic acid; 8.8 of silica; 496.9 of lignin; traces of starch; and 8828 parts of water. The oil distilled from tobacco, and called *tobacco oil*, is a most virulent poison. A single drop injected into the rectum of a cat occasioned death in about five minutes, and double the quantity administered to a dog in the same way produced the same result.

There are other species of tobacco besides that of which we have spoken at such length, which are cultivated for the same purposes. *N. rustica* furnishes Syrian Tobacco, and it is this species which is cultivated in Germany and France, as being more hardy than the preceding; it is also the best adapted for cultivation in Britain. *N. persica* supplies Persian Tobacco. *Acocanthera venenata* is a native of the Cape of Good Hope; and a decoction of the bark, reduced by boiling to the thickness of a jelly, is used by the Hottentots to poison their weapons. It is said to be very fatal in its effects, and is employed for destroying wild beasts. They also mix it with the poison of serpents. The juice of the berries of *Cestrum tinctorium*, which grows in New Granada, and is there called *Uvea*, forms a blue indelible ink, used by the viceroy in his official writings. The berries of all the species of *Cestrum* are poisonous.

ORDER CXLIV.—OROBANCHACEÆ—BROOM-RAPES.

THESE are nearly related to Gesneraceæ and Scrophulariaceæ, and do not appear to differ in any essential character from the Gesneraceæ with a free ovary. From the Scrophulariaceæ they are distinguished by a one-celled ovary, by the minute embryo at the base of the albumen, and by the habit of the plants, being parasitical.

GENERA AND SYNONYMES.

Epiphegus, <i>Nutt.</i>	Hæmodorum,	Lathræa, <i>L.</i>	? Æginetia, <i>L.</i>
Leptamnium, <i>Raf.</i>	[<i>Wallr.</i>	Squamaria, <i>Hall.</i>	? Epirhizanthus,
Myllanthe, <i>Wallr.</i>	Conopholis, <i>Wallr.</i>	Anoplanganthus, <i>Endl.</i>	[<i>Endl.</i>
Phelipæa, <i>Desf.</i>	Orobanche, <i>L.</i>	Anoplon, <i>Wallr.</i>	Epirixanthus, <i>Bl.</i>
Trionychion,	Osproleon, <i>Wallr.</i>	Anblatum, <i>T.</i>	Epirizanthus, <i>Bl.</i>
[<i>Wallr.</i>	Boschniakia <i>C. A. M.</i>	Ceratocalyx, <i>Coss.</i>	? Obolaria, <i>L.</i>
Kopsia, <i>Dum.</i>	Stellara, <i>Fisch.</i>	Boulardia <i>F. Sch.</i>	Schultzia, <i>Raf.</i>
Cistanche, <i>Link.</i>	Clandestina, <i>T.</i>	? Hyobanche, <i>Th.</i>	

GEOGRAPHICAL DISTRIBUTION.—They are most common in damp situations in the temperate and warmer parts of the northern hemisphere, and particularly in southern Europe and the African shores of the Mediterranean. In America they are rare.

PROPERTIES AND USES.—*Epiphegus virginiana*, called in America *Beech-drops* and *Cancer-root*, grows on the roots of the beech-tree in all parts of North America, and is considered useful in cases of dysentery and other bowel affections. It has a reputation for being useful in cancerous ulcers, to which it is applied in a state of powder; and it formed an ingredient in a once famous remedy called *Martin's Cancer Powder*, the chief properties of which, however, consisted in the arsenious acid it contained. *Anoplanganthus uniflorus* is used for a similar purpose. All the supposed medicinal virtues of *Orobanche* are now exploded. With *Phelipæa lutea* the Egyptians dye black the ropes made of *Hyphæne thebaica*.



ORDER CXLV.—SCROPHULARIACEÆ—Figworts.

HERBS or shrubs. *Leaves* generally opposite, sometimes alternate, simple.

Flowers arranged in spikes or in terminal clusters, hermaphrodite, irregular. *Calyx* permanent, with four or five unequal divisions. *Corolla* irregular, very varied in form, sometimes two-lipped. *Stamens* four, two long and two short, rarely two or five. *Ovary* seated on a hypogynous disk; two-celled, many ovuled; *ovules* anatropal or amphitropal; *style* simple, terminated by a simple two-lobed stigma. *Fruit* a two-celled capsule, rarely some-

what fleshy, the opening of which is very various; sometimes it is by a hole near the summit, by irregular plates, by two or four valves, each bearing a portion of the partition on the middle of its internal surface (loculicidal), or sometimes opposite the partition, which remains entire (septicidal). *Seeds* with fleshy albumen, and a straight,

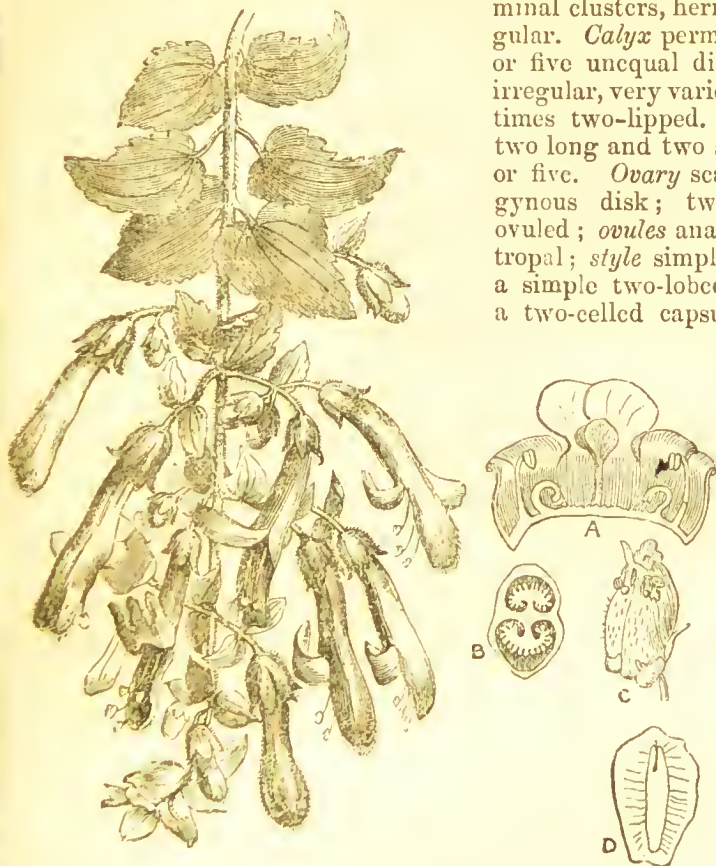


Fig. 173. *Pentstemon cordifolius*. A, Corolla of *Scrophularia aquatica* laid open; B, ovary of *Antirrhinum majus*; C, capsule of ditto; D, section of seed of *Scrophularia*.

cylindrical embryo having the radicle towards the hilum.

SUB-ORDER I.—SALPIGLOSSEÆ.

Æstivation of the corolla plaited or two-lipped, imbricate, the two upper segments exterior. Inflorescence centrifugal* from the first; capsule two-valved, valves entire, or bifid.

* A centrifugal inflorescence is when the terminal or central flower opens first, and the flowering proceeds downwards or outwards, as in Mint and Sweet-William.

GENERA AND SYNONYMES.

Duboisia, <i>R. Br.</i>	Mathea, <i>Vell.</i>	Browallia, <i>L.</i>	Vrolicia, <i>Sp.</i>
Anthocercis, <i>Lab.</i>	Pteroglossis, <i>Miers.</i>	Brunfelsia, <i>Sw.</i>	Salpiglossis, <i>R. & P.</i>
Schwenkia, <i>L.</i>	Leptoglossis, <i>Benth.</i>	Franseria, <i>Pohl.</i>	Schizanthus, <i>R. & P.</i>
Chaetochilus, <i>Vahl</i>	Streptosolen, <i>Miers.</i>	Heteranthia, <i>N. & M.</i>	

SUB-ORDER II.—ANTIRRHINEÆ.

Æstivation of the corolla two-lipped, imbricate, the two upper segments exterior. Inflorescence either wholly centripetal* or composite; the partial inflorescence in a centrifugal cyme; the primary in a centripetal thyrses.

TRIBE 1. *Calecolareæ*.—Corolla two-lobed; lobes entire, concave. Calyx four-cleft, valvate. Inflorescence composite. Leaves opposite or in whorls.

GENUS AND SYNONYMES.

Calecolaria, *L.*
Jovellana, *R. & P.*
Bua, *Pers.*

TRIBE 2. *Verbaceæ*.—Corolla rotate, two-lipped; lobes flat. Stamens declinate. Inflorescence centripetal, uniform. Leaves all alternate.

GENERA AND SYNONYMES.

Verbascum, <i>L.</i>	Celsia, <i>L.</i>	„ Thapsandra, <i>Gris</i>	Staurophragma,
Iananthe, <i>Grisb.</i>	Ditaxia, <i>Raf.</i>	Neflea, <i>Benth.</i>	[<i>Fseh.</i>

TRIBE 3. *Hemimerideæ*.—Corolla rotate or rarely tubular, two-lipped, fossulate, bagged, or spurred. Capsule two-valved. Inflorescence centripetal, uniform. Leaves, particularly the lower ones, opposite.

GENERA AND SYNONYMES.

Alonzoa, <i>R. & P.</i>	Angelonia, <i>H. & B.</i>	Thylacantha, <i>N.</i>	Diascia, <i>L. & O.</i>
Hemimeris, <i>HBK</i>	Physidium, <i>Schrd</i>	[<i>& M.</i>	Colpasia, <i>E. Mey.</i>
Schistanthe, <i>Kunze.</i>	Schlevertia, <i>N. & M.</i>	Hemimeris, <i>Th.</i>	Nemesia, <i>Vent.</i>
			Diels, <i>Benth.</i>

TRIBE 4. *Antirrhinidæ*.—Corolla tubular, frequently bagged or spurred. Capsule opening by pores. Inflorescence centripetal, uniform. Leaves, particularly the lower ones, opposite or in whorls.

GENERA AND SYNONYMES.

Linaria, <i>T.</i>	Anarrhinum, <i>Dcsf.</i>	Orontium, <i>Pers.</i>	Agassizia, <i>Chav.</i>
Elatine, <i>Mön.</i>	Simbleta, <i>Frsk.</i>	Maurandia, <i>Ort.</i>	Lophospermum, <i>Don</i>
Cymbalaria, <i>Gray</i>	Cardiotheca, <i>Ehrb</i>	Usteria, <i>Chav.</i>	Rhodoichiton, <i>Zucc.</i>
Kickxia, <i>Dum.</i>	Antirrhinum, <i>L.</i>	Galvezia, <i>Domb.</i>	Gambelia, <i>Nutt.</i>

* A *centripetal inflorescence* is when the lowest or outermost flower opens first, and the flowering proceeds upwards towards the top, or inwards towards the centre, as in the Lilac, the Grape, and the Currant.

TRIBE 5. *Cheloneæ*.—Corolla tubular, not bagged nor spurred. Capsule two to four-valved (rarely an unopening berry). Lobes or segments of the calyx imbricate in æstivation. Inflorescence composite.

GENERA AND SYNONYMES.

Digomphia, <i>Benth.</i>	Scrophularia, <i>T.</i>	Chionophila, <i>Benth.</i>	Borkhausenia,
Phygelius, <i>E. Mey.</i>	Collinsia, <i>Nutt.</i>	Tetranema, <i>Benth.</i>	[<i>Roth.</i>
Paulownia, <i>Zucc.</i>	Chelone, <i>L.</i>	Russelia, <i>Jacq.</i>	Ixianthes, <i>Benth.</i>
Wightia, <i>Wall.</i>	Pentstemon, <i>Herit.</i>	Freylinia, <i>Colla.</i>	Leucocarpus, <i>Don.</i>
Diplanthera, <i>Banks.</i>	Elmigera, <i>Rehb.</i>	Anastrabe, <i>E. Mey.</i>	Hemichaena <i>Benth.</i>
Halleria, <i>L.</i>	Dasanthera, <i>Raf.</i>	Teedia, <i>Rud.</i>	

TRIBE 6. *Escobediceæ*.—Corolla tubular, neither bagged nor spurred. Capsule two-valved. Calyx valvate in æstivation. Inflorescence centripetal; flower-stalks furnished with two bracts. Leaves, particularly the lower ones, opposite.

GENERA AND SYNONYMES.

Escobedia, <i>R. & P.</i>	Melasma, <i>Berg.</i>	Gastromeria, <i>Don</i>	Glossostyles,
Silvia, <i>Vell.</i>	Nigrina, <i>L.</i>	Alectra, <i>Th.</i>	[<i>Cham.</i>
Physocalyx, <i>Pohl.</i>	Lyncea, <i>Ch. & S.</i>	Starbia, <i>Thouars.</i>	

TRIBE 7. *Gratioleæ*.—Corolla tubular, rarely somewhat rotate, neither bagged nor spurred. Capsule two-valved, very rarely unopening. Lobes or segments of the calyx imbricate in æstivation. Inflorescence centripetal, uniform, rarely irregularly composite.

SUB-TRIBE 1. *APTOSIMIDÆ*.—*Leaves all alternate.*

GENERA AND SYNONYMES.

Leucophyllum, <i>H.</i>	Aptosimum, <i>Burch.</i>	Peliostomum, <i>EMey</i>	Doratanthera <i>Benth.</i>
[<i>B. K.</i>	Chilostigma,	Anticharis, <i>Endl.</i>	Ohlendorfia <i>Lehm</i>
Leucanthea, <i>Scheele</i>	[<i>Hochst.</i>	Meissarrhena, <i>R.</i>	
		[<i>Br.</i>	

SUB-TRIBE 2. *MANULEADÆ*.—*Leaves, particularly the lower ones, opposite. Anthers one-celled.*

GENERA AND SYNONYMES.

Nycterinia, <i>Don.</i>	Polycarena, <i>Benth.</i>	Chænostoma, <i>Benth.</i>	Manulea, <i>L.</i>
Zalwzianski, <i>J. W</i>	Phyllopodium <i>Benth.</i>	Lyperia, <i>Benth.</i>	Nemia, <i>Berg.</i>
[<i>Schm.</i>	Sphenandra, <i>Benth.</i>	Sutera, <i>Roth.</i>	

SUB-TRIBE 3.—*GRATIOLIDÆ*.—*Leaves, particularly the lower ones, opposite. Anthers two-celled. Stamens all inclosed within the tube.*

DIV. 1. Calyx five-toothed or five-cleft. Cells of the anthers contiguous.

GENERA AND SYNONYMES.

Diplacus, <i>Nutt.</i>	Uvedalia, <i>R. Br.</i>	Melosperma, <i>Benth.</i>	Hornemannia, <i>Rehb</i>
Mimulus, <i>L.</i>	Eunanus, <i>Benth.</i>	Mazus, <i>Lour.</i>	Dodartia, <i>L.</i>
Erythranthe <i>Spch</i>			

DIV. 2. Calyx five-toothed or five-parted. Cells of the anthers disjoined.

GENERA AND SYNONYMES.

Lindenbergia, [L. & O.	Beyrichia, <i>Cham.</i>	Stemodia, <i>L.</i>	Limnophila, <i>R. Br.</i>
Brachycoris, [Schrđ	Achetaria, <i>Cham.</i>	Adenosma, <i>R. Br.</i>	Ambulia, <i>Lam.</i>
Bovea, <i>Decaisne.</i>	Matourea, <i>Vahl.</i>	Unanuea, <i>R. & P.</i>	Cybbanthera, [Ham.
	Tetraulacium, <i>Trez.</i>	Matourea, <i>Aub.</i>	Hydropityou, <i>Gärt.</i>
	Pterostigma, <i>Bnth.</i>	Morgania, <i>R. Br.</i>	

DIV. 3. Calyx five-parted. Stamens four, rarely five. Cells of the anthers contiguous.

GENERA AND SYNONYMES.

Canoea, <i>Aubl.</i>	Schistophragma <i>Bth</i>	„, <i>Bramia, Lam.</i>	Heinzelmannia, [Neck.
Leucospora, <i>Nutt.</i>	Herpestis, <i>Gärt.</i>	Monniera, <i>R. Br.</i>	Bacopa, <i>Aubl.</i>
Spherotheca, <i>Ch.</i>	Mecardonia, <i>Mrt.</i>	Calytriplex, <i>R. & P.</i>	Geochorda, <i>Ch.</i>
Lafuentea, <i>Lag.</i>	Caconapea, <i>Ch.</i>	Septas, <i>Lour.</i>	Ildefonsia, <i>Gard.</i>
Duricua, <i>Mer.</i>	Ranaria, <i>Ch.</i>	Mella, <i>Vand.</i>	

DIV. 4. Calyx five-parted. Fertile stamens, two.

GENERA AND SYNONYMES.

Gratiola, <i>L.</i>	Nibora, <i>Raf.</i>
Sophranathe, <i>Benth.</i>	Dopatrium, <i>Ham.</i>

SUB-TRIBE 4. LINDERNIDÆ.—*Leaves, particularly the lower ones, opposite. Anterior stamens inserted in the throat, sometimes sterile and club-shaped, sometimes arched; filaments toothed at the base.*

DIV. 1. Style with a broad, membranous apex, concave, or consisting of two plates. Posterior stamens fertile.

GENERA AND SYNONYMES.

Ar'anema, <i>Don.</i>	Torenia, <i>L.</i>	Vandellia, <i>L.</i>	Vriesia, <i>Hassk.</i>
Achimenes, <i>Vahl.</i>	Nortenia, <i>Thours.</i>	Tittmannia, <i>Rehb</i>	Lindernia, <i>All.</i>
Diceros, <i>Pers.</i>	Craterostigma, [Hochst.	Ilyogeton, <i>Endl.</i>	Ilysanthes, <i>Raf.</i>
Curanga, <i>Juss.</i>	Dunalia, <i>R. Br.</i>	Ellobum, <i>Bl. ?</i>	Bonnaya, <i>L. & O.</i>
Synphyllum <i>Griff</i>		Diceros, <i>Bl. ?</i>	

DIV. 2. Style with a club-shaped or spatulate apex, entire. Flowers minute. Posterior stamens wanting, anterior ones fertile; filaments widened, or furnished with appendages at the base.

GENERA AND SYNONYMES.

Peplidium, <i>Dcl.</i>	Pinardia, <i>Vell.</i>
Micranthemum, [L. C. Rich.	Globifera, <i>Gmel.</i>
	Hemianthus, <i>Nutt.</i>

SUB-ORDER III.—RHINANTHÆ.

Æstivation of the corolla imbricate; the posterior lip never external. Inflorescence either wholly centripetal or composite, or very rarely (as in a few of the tribe Buddleæ) wholly centrifugal.

TRIBE 1. Sibthorpeæ.—*Leaves alternate or fasciculate, rarely opposite, not connected by the footstalks. Axillary flowers fasciculate, cymose, or solitary; the superior ones rarely fasciculato-racemose.*

DIV. 1. Creeping or aquatic herbs.

GENERA AND SYNONYMES.

Amphianthus, <i>Torr.</i>	Glossostigma, <i>Arn.</i>	Danubiunculus,	Willichia, <i>L.</i>
Hydranthelium,	Tricholoma,	[<i>Sailez.</i>	Hornemannia <i>Benth</i>
[<i>H. B. K.</i>	[<i>Benth.</i>	Sibthorpia, <i>L.</i>	Mazus pinnatus,
Willichia, <i>Sp.</i>	Limosella, <i>L.</i>	Disandra, <i>L.</i>	[<i>Wall.</i>

DIV. 2. Erect or half-shrubby herbs.

GENERA AND SYNONYME.

Capraria, <i>L.</i>	Pogostoma, <i>Schrad.</i>	Scoparia, <i>L.</i>
Xuarczia, <i>R. & P.</i>	Camptoloma, <i>Benth</i>	

TRIBE 2. *Buddleæ*.—Leaves all opposite, the footstalks connected by a membrane or transverse line. Flowers cymose, or rarely axillary and solitary.

GENERA AND SYNONYME.

Microcarpæa, <i>R. Br.</i>	Gomphostigma,	„ <i>Chillanthus</i> , <i>Brch</i>	Psyloxyon, <i>Thou.</i>
Bryodes, <i>Benth.</i>	[<i>Trez.</i>	Lachnopylis,	Buddlea, <i>L.</i>
Polypremum, <i>L.</i>	Nuxia, <i>Vent.</i>	[<i>Hochst.</i>	Nicodemia, <i>Tenor.</i>

TRIBE 3. *Digitaleæ*.—Inflorescence centripetal, spicate, or racemose. Leaves all alternate, the lower ones furnished with footstalks.

DIV. 1. Stamens, two long and two short, included in the tube of the corolla. Style two-cleft at the apex.

GENERA AND SYNONYME.

Isoplexis, <i>Lindl.</i>	Digitalis, <i>L.</i>
Callianassa, <i>Webb.</i>	Erinus, <i>L.</i>

DIV. 2. Stamens two or four, nearly equal, distant.

GENERA.

Pierorhiza, <i>Royle</i>	Synthyris, <i>Benth.</i>	Wulfenia, <i>Jacq.</i>	Calorhabdos, <i>Bnth.</i>
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TRIBE 4. *Veroniceæ*.—Inflorescence centripetal, racemose. Leaves, particularly the lower ones, opposite. Stamens distant; anthers two-celled, or confluent one-celled.

GENERA AND SYNONYMES.

Pæderota, <i>L.</i>	„ <i>Callistachya</i> , <i>Raf</i>	„ <i>Cochlidiosper-</i>	Omphalospora,
Veronica, <i>L.</i>	Eustachya, <i>Raf.</i>	[<i>mum</i> , <i>Reichb.</i>	[<i>Besser.</i>
Hebe, <i>Juss.</i>	Aidelus, <i>Sp.</i>	Diplophyllum,	Aragoa, <i>H. B. K.</i>
Leptandra, <i>Nutt.</i>		[<i>Lchm.</i>	Ourisia, <i>Com.</i>
			Dichroma, <i>Cav.</i>

TRIBE 5. *Buchnereæ*.—Inflorescence centripetal, racemose. Leaves, particularly the lower ones, opposite. Stamens near together in pairs; anthers one-celled.

GENERA AND SYNONYMES.

Buchnera, <i>L.</i>	Campulcia, <i>Thou.</i>	Cycnium, <i>E. Mey.</i>
Peripca, <i>Aub.</i>	Rhamphicarpa, <i>Bnth.</i>	Hyobanche, <i>Th.</i>
Striga, <i>Lour.</i>	Macrosiphon, <i>Kch.</i>	

TRIBE 6. *Gerardiæ*.—Inflorescence centripetal, racemose. Leaves, particularly the lower ones, opposite. Stamens near together in pairs; anthers two-celled, cells often pointed, or awned at the base, distinct, parallel.

SUB-TRIBE 1. *ANOMALÆ*.—*Anthers pointed or awned. Lobes of the corolla nearly equal, spreading, the posterior ones internal.*

GENERA.

Hydrotriche, Zucc.

| *Campylanthus*, Roth.

SUB-TRIBE 2. *GERARDIADÆ*.—*Herbs or shrubs, with the inferior leaves opposite. Tube of the corolla swollen above (except in Radamæa). Stamens four (two rarely smaller, and sterile); cells of the anthers equal.*

GENERA AND SYNONYMES.

<i>Radamæa</i> , Benth.	<i>Dargeria</i> , Dene.	<i>Silvia</i> , Benth.	<i>Gerardia</i> , L.
<i>Rhaphispermum</i> ,	<i>Seymeria</i> , Pers.	<i>Maeranthera</i> , Tor.	<i>Virgularia</i> , R. & P.
[Benth.	<i>Afzelia</i> , Gmel.	<i>Conradia</i> , Nutt.	<i>Dasystema</i> , Raf.
<i>Micrargeria</i> , Benth.	<i>Otophylla</i> , Benth.	<i>Esterhazyia</i> , Mik.	<i>Pegesia</i> , Raf.
<i>Leptorhabdos</i> , Schrk			

SUB-TRIBE 3. *SOPUBIADÆ*.—*Leaves or scales opposite, or the upper ones alternate. Tube of the corolla long or short; throat bell-shaped. One cell of the anther smaller than the other, awned, and often hollow. Pedicels with two small bracts.*

GENERA AND SYNONYMES.

<i>Graderia</i> , Benth.	<i>Rhaphidophyl-</i>	„ <i>Psammostachys</i> ,	<i>Centranthera</i> , R. Br.
<i>Bopusia</i> , Presl.	[lum, Hochst.	[Prl.	<i>Razumovia</i> , Spz
<i>Sopubia</i> , Ham.	<i>Aulaya</i> , Harv.	<i>Microscyphus</i> Prl	<i>Purshia</i> , Denn.
	<i>Harveya</i> , Hook.		

TRIBE 7. *Euphrasieæ*.—Inflorescence centripetal, racemose. Posterior lip of the corolla hooded or concave, erect.

SUB-TRIBE 1. *CASTILLEJADÆ*.—*Cells of the anthers narrow, the external one fixed in the middle, the internal pendulous, smaller, or rarely wanting.*

GENERA AND SYNONYMES.

<i>Castilleja</i> , L. f.	<i>Orthocarpus</i> , Nutt.	<i>Onchorhynchus</i> , Lehm
<i>Euchroma</i> , Nutt.	<i>Triphysaria</i> , F. & M.	<i>Adenostegia</i> , Benth.

SUB-TRIBE 2. *SCHWALBIADÆ*.—*Cells of the anthers equal. Seeds numerous. The radicle directed to the hilum. Two small bracts under the calyx.*

GENERA.

Schwalbça, L.

| *Siphonostegia*, Benth.

| *Synnema*, Benth.

SUB-TRIBE 3. *BARTISIADÆ*.—*Cells of the anthers equal. Seeds numerous, transverse, or pendulous. Radicle directed towards the hilum. Bracts wanting.*

GENERA AND SYNONYMES.

<i>Phtheirospermum</i> , Bunge.	<i>Trixago</i> , Stev.	<i>Stæhelina</i> , Hall.
<i>Lamourouxia</i> , H. B. K.	<i>Bellardia</i> , All.	<i>Odontites</i> , Hall.
<i>Eufragia</i> , Grieb.	<i>Bartsia</i> , L.	<i>Euphrasia</i> , L.

SUB-TRIBE 4. RHINANTHIDÆ.—*Cells of the anthers equal. Seeds rather large, frequently few in number, affixed laterally, or ascending, rarely almost pendulous. Radicle directed to the apex of the fruit.*

GENERA AND SYNONYMES.

* *Two bracts under the calyx.*

Cymbaria, L.

| Bungea, C. A. Meyer.

** *Bracts wanting.*

Rhinanthus, L.

| Rhyncocorys, Griseb.

| Rhinanthus, Bieb.

Alectorolophus, Bieb.

| Elephas, T.

| Pedicularis, L.

SUB-TRIBE 5. MELAMPYRIDÆ.—*Cells of the anthers equal. Cells of the ovary two-ovuled.*

GENERA.

Malampyrum, L.

| Tozzia, L.

GENERA NOT SUFFICIENTLY KNOWN.

Diceros, Lour.

| Picria, Lour.

| Sanchezia, R. & P.

| Parentucellia, Viv.

Gomara, R. & P.

| Poarium, Desv.

| Tala, Blanco.

GEOGRAPHICAL DISTRIBUTION.—These are found in every part of the habitable world, and are most abundant in the temperate and warmer regions of both hemispheres; between the tropics they are more rare, and towards the poles they are seldom met with.

PROPERTIES AND USES.—The plants of this family exhibit properties of various kinds, such as a bitter, astringent, and acrid principle, mixed with mucilage, resinous substances, and essential oils. Some are tonic and bitter, others drastic purgatives and emetics; some are acrid narcotics, and many are suspicious.

The leaves of *Calceolaria pinnata* are purgative, and, if given in a strong dose, cause vomiting. *C. trifida*, a native of Peru, is employed as a febrifuge and antiseptic by the inhabitants. The roots of *C. arrachnoidea*, called *Relbum* in Chili, are largely employed for dyeing woollen cloth crimson. Common *Mullein* (*Verbascum thapsus*) may frequently be found in Britain, growing in waste places, particularly in gravelly or chalky soils. It is known in different parts of the country by the names of *Shepherd's Club*, *Ladies' Foxglove*, *High-taper*, *Hare's-beard*, *Torches*, and *Bullock's Lungwort*. The whole plant is mucilaginous, and is reckoned pectoral and emollient. Some authors have considered the flowers to be possessed of narcotic properties, from being prescribed as an antispasmodic, and the seeds having the property of stupefying fish; but in the analysis of M. Morin, of Rouen, he did not find any narcotic principle. They contained a yellowish volatile oil, an acrid, fatty matter, free acid and phosphoric acid, uncrystallisable sugar, gum, a green fatty matter, a sort of chlorophylle, a yellow colouring principle, and some mineral salts, the bases of which were potassa and lime. An infusion of the flowers, sweetened with sugar or honey, is used as a domestic remedy against catarrhs, colic, and heat of the urine; and the distilled water is said to be good against burns and erysipelas.

A handful of the leaves, boiled in a pint of cow's milk to half a pint, sweetened with sugar, strained, and taken at bedtime, forms an emollient and pleasant drink, for allaying coughs and the irritation of hemorrhoids. In India the natives believe that this plant has the power of preserving them from the visits of evil spirits. *V. blattaria*, or *Moth Mullein*, is also a native of Britain, and its seeds are said to intoxicate fish. *V. lychnitis* is so called because it is supposed to be the plant with the leaves of which the Greeks made wicks for their lamps, a purpose to which the leaves of almost all the species would be equally applicable, from their being so downy. The leaves of *V. phanicium*, according to Pallas, are used in Siberia as a substitute for tea.

That pretty little trailing plant, with ivy-shaped leaves, and bluish-purple flowers, which is often seen dangling in tassels from chinks in old walls, is the *Ivy-leaved Toad-flax* (*Linaria cymbalaria*). The whole plant has a hot, peppery taste, like that of cress, horse-radish, and Indian-cress, hence it is inferred to have anti-scorbutic properties. In India the native physicians are said to administer it, mixed with sugar, in cases of diabetes. *L. elatine* is said to be purgative. *Common Toad-flax* (*L. vulgaris*), so common in fields in many parts of Britain, is bitter and slightly acrid, with a heavy, disagreeable odour. It has been much praised as a purgative, and particularly so as a diuretic; and it has been employed in fomentations to hemorrhoidal tumours. Its flowers have been recommended in chronic diseases of the skin, to which they are applied in the form of an ointment. In Sweden the plant boiled in milk is used for killing flies. It is sometimes remarked that the irregular corolla on this plant becomes quite regular on some of the spikes. The flowers afford a yellow dye. The *Common Snapdragon* (*Antirrhinum majus*) of the gardens may sometimes be met with growing in the chinks of old walls about towns, but it is not a true native of Britain. The whole plant is bitter, and appears to be stimulant. Gmelin states that in Persia an excellent oil, equal to that of the olive, is extracted from the seeds, which are very abundant. They are first heated, then bruised, and afterwards submitted to pressure. Vogel says that in some countries the common people ascribe to this plant the power of destroying charms and evil influences. *A. porcinum*, of Loureiro, is used in Cochinchina for fattening swine.

Scrophularia nodosa, or *Knotted Figwort*, is bitter, with a strong, nauseous odour, and the decoction was formerly considered as a remedy against scrofula, but it does not in reality possess any such virtues. Water extracts the virtues of the plant, forming a reddish infusion, which is blackened by the sulphate of the sesqui-oxide of iron. It is, however, considered beneficial in cutaneous diseases, by bathing the pustules with it for several days. It is said to be resolvent and carminative; its seeds are vermifuge, and are used to make a gargle in quinsy. Swine that have the scab are cured by washing them with a decoction of the leaves. Wasps are greatly attracted by the flowers. Goats eat the plant, but cows, horses, sheep, and swine refuse it. *Water Figwort*, or *Water Betony* (*S. aquatica*), has the same reputed properties as the preceding. Both are abundant in wet places, and by the sides of ditches in Britain. They are certainly exciting, acrid, and bitter, but their true properties are very little known. There is a species in Brazil, called *caa-cua*, or *Yquetuia*, which, according to Marchand, appears to be *S. aquatica*,

and which is successful in the cure of apoplexy, pleurisy, and intermittent fevers. A decoction of *S. canina* is used in Italy to cure cutaneous diseases in dogs and swine. *Mimulus luteus* is used in Peru as a potherb. The pretty little *Musk Plant* now so common in every garden and on every window-sill, is *M. moschatus*, a native of Oregon. *Herpestis monniera* is a native of India, and South America, where its roots and stems are employed as aperients and diuretics, particularly in the retention of urine, accompanied with obstinate constipation. Roxburgh says that its juice, mixed with petroleum, is useful as a local application in rheumatism. Martius and Aublet state that its roots are acrid and aromatic, diuretic and sudorific, and that they are employed in Brazil in poisonings, fevers, and even inflammations.

Gratiola officinalis, or *Hedge Hyssop*, is a common plant in most places, by the margins of ponds, and the banks of rivers, over the whole continent, but it is not found in Britain. It has been called *Gratia Dei*, from the great medicinal properties it is thought to possess, and in France it is called *Poor Man's Herb*. When fresh the plant has a very bitter, nauseous taste, so much so that cattle will not touch it, and therefore, as Haller says, its abundance in the Swiss pastures renders them wholly useless; but, when dried, it loses a great part of its activity, and then horses eat a little of it in their fodder; but the same author remarks that it so purges and wastes them that they become quite lean. The plant is generally used as a popular domestic remedy in dropsy, jaundice, worms, chronic affections of the liver, scrofula, and various other complaints; but it is very dangerous and requires to be used with great caution. The stem, leaves, and flowers act as a violent drastic purgative, and cause inflammation of the bowels, diarrhoea, and convulsions. Orfila has seen dogs destroyed a few hours after taking the extract of the plant. The active properties of the plant appear to reside in a bitter, resinous substance, called *gratioline*, and which Vanquelin compares to the active principle of colocynth. By analysis, *Gratiola* contains a brown, gummy matter, the very bitter resinous substance already mentioned, malate and phosphate of chalk, another calcareous salt, the base of which is an undetermined acid, silica, and lignin. *G. peruviana* has a bitter taste, and acts as a purgative and a febrifuge. The leaves of *Couranga amara*, a native of the Moluccas, are excessively bitter. *Vandellia diffusa* is a native of Guiana, and called *Cua-ataica*. Dr. Hancock says it is emetic, and that the decoction is useful in continued and intermittent fevers, as well as in diseases of the liver. It supplies the medicine called *haimerada* in Guiana. Earl Stanhope was of opinion that it might be advantageously substituted as a purgative for mercurial preparations. The root of *Scoparia dulcis* is used in the West Indies, in decoction, as a cure for gonorrhoea, and to regulate the menses. In Guiana the juice is dropped into the ear to cure earache; and Humboldt affirms that in the valleys of Peru the natives use the plant against fevers, in preference to cinchona. The leaves of *Torenia asiatica* are used against gonorrhoea on the coast of Malabar.

Forglove (*Digitalis purpurea*) is often found wild in Britain, on sandy and gravelly soils, and is cultivated in gardens for the beauty of its flowers. If the leaves are rubbed between the fingers they emit a nauseous odour, which is dispelled in drying, and they have a bitter and slightly acrid taste.

The plant is narcotic, sedative, and diuretic. When administered in small doses it has not any marked effect on the system, but in large doses it produces nausea, vertigo, headache, dimness of sight, secretion of saliva and urine, vomiting, frequent action of the bowels, increased pulse and confusion of thought, and convulsions. Its medicinal properties were first brought into notice by Withering, and, when judiciously administered, it has proved valuable, both as a diuretic and for its sedative influence over the circulation. It is highly useful in dropsy, in controlling the action of the heart, in aneurism, hypertrophy, and enlargement of the heart, palpitations from gouty or rheumatic irritation, and in various forms of hemorrhage. It has also been prescribed in mania, epilepsy, spasmodic asthma, and whooping-cough. But, as a medicine, it should never be administered unless by a skillful and practised hand, because of its extreme activity, and the dangers resulting from an imprudent use of it; and one of its peculiarities is that, after having been given in moderate doses for several days, without apparent effect, it sometimes acts suddenly, with an accumulated influence, even to the danger of life. It is also very permanent in its operation, which having once commenced, is maintained, like that of mercury, for a considerable period, without any fresh accessions of the medicine. The virtues of Fox-glove are owing to the presence of an active principle, called *digitaline*, which is a white, inodorous substance, crystallisable with difficulty, of an intense bitterness, causing sneezing when powdered, and having the peculiar effects of the plant on the system. In the dose of about one-thirteenth of a grain, three times a day, continued for three days, it lessened the frequency of the pulse to 50 in a minute, produced headache, and other unpleasant effects on the brain, and sensibly increased the urine. The effect continued for two days after the suspension of its use. Besides the bitter principle, *digitalis* contains a volatile oil, a fatty matter, a red colouring substance, analogous to extractive, chlorophylle, albumen, starch, sugar, gum, lignin, and salts of potassa and lime, among which, according to Rein and Hasse, is super-oxalate of potassa. M. Morin, of Geneva, has also discovered in the leaves two acids; one fixed, which he calls *digitalic acid*, the other volatile, resembling valerianic acid, and called *antirrhinic acid*. *D. grandiflora*, *ferruginea*, *lævigata*, and *ochroleuca*, have all the same properties as *purpurea*.

Veronica officinalis, or *Speedwell*, a common weed in Britain, has a slightly bitter, warm, and somewhat astringent taste. It is supposed to contain a little tannin, and has the reputation of being sudorific, diuretic, tonic, stomachic, and expectorant, but it is now seldom if ever employed. It has been used as a substitute for tea, particularly in Sweden, and some parts of Germany, but the leaves of *V. chamædrys* are said to be better for the purpose. Simon Paulli, an old Danish botanist, contended that it was the true tea of China. *V. incana*, a native of Siberia, is eaten by cattle, and it is said by Pallas to cure them of scab, contracted by standing in the stables in winter, by acting as a safe purgative. He asserts that its juice causes blisters on the human skin. *V. beccabunga*, called *Brooklime*, is very common in the ditches of this country. It is very succulent, and is collected in spring to be used as an anti-scorbutic, like water-cress, and other plants of similar virtues. The young shoots are eaten in salads, in some countries, and the plant resembles the cruciferae in its composition,

pungent flavour, and volatile principle. It is said to be actively diuretic. *V. virginica* is a native of the United States, and is there called *Calver's Physic*. The root is bitter and nauseous, and when used in a fresh state, in the form of decoction, it acts as a violent cathartic and emetic. *Eye-bright* (*Euphrasia officinalis*) is a pretty little plant, abundant in mountainous pastures in this country. It is slightly bitter and astringent, and has enjoyed great reputation for its many virtues, which, in the present day, are not appreciated. *Pedicularis palustris*, or *Marsh Louse-wort*, so plentiful in marshy places in this country, is so called from being supposed to be destructive to these insects. The plant is acrid, and refused by cattle, goats and swine being the only animals that eat it; it is said to be destructive to sheep. *P. sylvatica* is regarded as an astringent, serviceable in stopping hemorrhages. Gmelin says that in Siberia it is employed against syphilis. Applied externally it acts as a vulnerary, a cure for fistula, and to cleanse old ulcers. Dr. Ainslie states that *P. lanata* is used in the form of tea. *Melampyrum pratense*, or *Common Cow-wheat*, is said to give a yellow colour to the butter of cows fed in places where it abounds. *M. arvense*, or *Purple Cow-wheat*, is said to furnish excellent forage for cattle, and particularly for cows.



ORDER CXLVI.—LABIATÆ.—LABIATE FLOWERS.

HERBS, rarely shrubs, with square stems. *Leaves* opposite, aromatic, without leaflets at their base. *Calyx* bell-shaped, regular or irregular, five-toothed. *Corolla* tubular, irregular, two-lipped; the upper one is sometimes, but rarely wanting, or very short. *Stamens* four, two long and two short; sometimes the two short ones are abortive. *Anthers* two-celled, cells contiguous, sometimes confluent in one, or widely separated on a long connective, one of them generally empty. *Ovary*, seated on a hypogynous disk, is deeply four-lobed, four-celled, very much depressed in the centre, from which issues the simple style, terminated by a two-cleft stigma. *Fruit* composed of four one-seeded seed-nuts, enclosed in the interior of the permanent calyx. *Seeds* erect, sometimes with a very thin fleshy albumen, but generally wanting. *Embryo* erect, with flat seed-lobes.

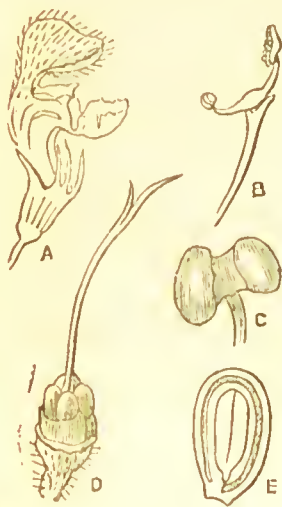


Fig. 174. A, Flower of *Lamium album*; B, stamen of *Salvia officinalis*, with widely separated anther-cells, one of which is fertile, the other sterile; C, pistil of ditto; D, section of seed of ditto; E, stamen of *Melissa grandiflora*.

TRIBE 1. Ocimeæ.—Stamens declinate.

SUB-TRIBE 1. MOSCHOSMIDÆ.—Segments of the corolla of almost equal length, lower one the narrowest, declinate, flat, or slightly concave.

GENERA AND SYNONYME.

Ocimum, L.
Geniosporum, Wall.
Mesona, Bl.
Platostoma, Palis.
Acrocephalus, Benth.

Moschosma, Rehb.
Lumnitzera, Jacq.
Orthosiphon, Benth.
Syncolostemon, E. M.

SUB-TRIBE 2. PLECTRANTHIDÆ.—Lower segment of the corolla elongated, concave.

GENERA AND SYNONYMS.

Hoslundia, Vahl.
Plectranthus, Herit.
Germanca, Lam.

Dentidia, Lour.
Isodon, Schrad.
Coleus, Lour.

Solenostemon,
 [Schum.]
Æolanthus, Mart.
Anisochilus, Wall.

Pycnostachys, Hook.
Echinostachys,
 [E. M.]

SUB-TRIBE 3. HYPTIDÆ.—Lower segment of the corolla contracted at the base, afterwards bagged, abruptly deflexed.

GENERA AND SYNONYMS.

Peltodon, Pohl.
Marsypianthus,
 [Mart.]

Hyptis, Jacq.
Schaueria, Hassk

„ *Raphiodon*,
 [Schauer.]

Hypothronia,
 [Schrank]
Eriope, H. & B.

SUB-TRIBE 4. *Corolla two-lipped, with the upper lobe two-cleft, the inferior one three-cleft. Stamens two, inclosed.*

GENUS AND SYNONYMES.

Lavendula, *T.*
 Stachas, *T.*
 Fabricia, *Adans.*
 Chætostachys, *Benth.*

TRIBE 2. *Satureiæ*.—Stamens four or two (anthers both two-celled, connective not filiform), distant, straight, diverging, or near together under the upper lip. Lobes of the corolla flat.

SUB-TRIBE 1. *ELSHOLTZIDÆ*.—*Stamens four, cells of the anthers confluent; pollen ovato-reniform or orbiculate.*

GENERA AND SYNONYMES.

* *Anthers one-celled from the first, nearly globose.*

Pogostemon, <i>De f.</i>	Dysophylla, <i>Bl.</i>	Colebrookia, <i>Sm.</i>
Wensea, <i>Wendl.</i>	Chotekia, <i>Opiz.</i>	Tetradenia, <i>Ben'h.</i>

** *Cells of the anthers at length confluent, one-celled.*

Elsholtzia, *W.*
 Aphanochilus, *Benth.*
 Cyclostegia, *Benth.*

SUB-TRIBE 2. *MENTHIDÆ*.—*Corolla almost equal. Stamens distant, not connivent. Anthers two-celled.*

GENERA AND SYNONYMES.

* *Fertile stamens, four.*

Perilla, <i>L.</i>	Mentha, <i>L.</i>
Dentidia, <i>Lour.</i>	Pulegium, <i>Mill.</i>
Preslia, <i>Opiz.</i>	

** *Fertile stamens, two.*

Lycopus, *T.*

SUB-TRIBE 3. *THYMIDÆ*.—*Corolla two-lipped (the lips sometimes obscure), interior of the tube naked. Stamens distant or divergent, not connivent. Anthers two-celled.*

GENERA AND SYNONYMES.

* *Fertile stamens, two.*

Cunilla, *L.*

*** *Fertile stamens, four.*

Zataria, Boiss.	„ Brachystemum,	Monardella, Benth.	Schizocalyx,
Bystropogon, Herit.	[Mich.	Origanum, T.	[<i>chcelz.</i>
Pycnanthemum,	Koellia, Mön.	Amaracus, Gled.	Thymus, L.
[Mich.]	Tullia, Laven.	Majorana, Mön.	Serpyllum, Pers.

SUB-TRIBE 4. MELISSIDÆ.—*Corolla two-lipped; inside of the tube naked. Stamens four or two, ascending at the base, and divergent at the apex, or connivent under the upper lip.*

GENERA AND SYNONYMES.

* *Fertile stamens four.*

Satureia, L.	Calamintha, Benth.	Gardoquia, R. & P.	Dicerandra, Benth.
Micromeria, Benth.	Aeinos, Spenn.	Thymbra, L.	Ceranthra, Ell.
Sabbatia, Mö.	Clinopodium,	Melissa, T.	Pogogyne, Benth.
Piperella, Presl.	[Spenn.]	Mutelia, Gren.	

** *Fertile stamens two.*

Hedeoma, Pers.

Keithia, Benth.

ANOMALOUS GENERA AND SYNONYME.

Glechon, Sp.	Sphaecle, Benth.	Cuminia, Colla.	Lepechinia, W.
Hyssopus, Benth.	Phytoxys, Molin.	Dekinia, Martens.	Horminum, Benth.
Collinsonia, L.			

TRIBE 3. Monardææ.—*Stamens two, straight, or ascending. Cells of the anthers linear, oblong, either solitary or disjoined, with a filiform connective (very rarely approximate in Perowskia).*

GENERA AND SYNONYMES.

Perowskia, Karel.	„ Horminum, T.	Stenarrhena, Don	Cheilyetis, Raf.
Dorystachas, Boiss.	Sclarea, T.	Leonia, Ll. & Lex.	Blephilia, Raf.
Meriandra, Benth.	Æthiopis, T.	Audibertia, Benth.	Zizyphora, L.
Salviastrum, Scheele	Schraderia, Mön.	Rosmarinus, T.	Faldermannia, ¹
Salvia, L.	Jungia, Mön.	Monarda, Benth.	[Bunge.]

TRIBE 4. Nepetææ.—*Stamens four, the posterior (not the anterior as in the other tribes) longer.*

GENERA AND SYNONYMES.

Lophanthus, Benth.	Marmoritis, Benth.	Zornia, Mön.	Cedronella, Mön.
Plechia, Raf.	Dracocephalum, L.	Ruyschiana, Mill.	Hymenocater F&M
Nepeta, Benth.	Moldavica, Mön.	Lallemantia, F.&M.	Sestinia, Boiss.
Cataria, Mön.			

TRIBE 5. Stachyææ.—*Stamens four, under the helmet, parallel, ascending. Upper lip of the corolla concave or keel-shaped. Nuts smooth or tubercled, free at the base, erect.*

SUB-TRIBE 1. SCUTELLARIDÆ.—*Calyx two-lipped, not inflated, the lips enclosing the fruit.*

GENERA AND SYNONYMES.

Brunella, A. DC.	Cleonia, L.	Cassida, T.
Prunella, T.	Scutellaria, L.	Perilomia, Kunth.

SUB-TRIBE 2. MELITTIDÆ.—*Calyx fructiferous, either inflated or three to four lobed.*

GENERA AND SYNONYME.

Melittis, <i>L.</i>	Brazozia, <i>Engelm.</i>	Rhodochlamys, <i>Schau.</i>
Melissophyllum, <i>Riv.</i>	Macbridea, <i>Elliott.</i>	Synandra, <i>Nutt.</i>
Physostegia, <i>Benth.</i>		

SUB-TRIBE 3. MARRUBIDÆ.—*Stamens included in the tube of the corolla.*

GENERA AND SYNONYMS.

Acrotome, <i>Benth.</i>	„ Burgsdorffia, <i>Mön.</i>	Marrubium, <i>Benth.</i>
Tapeinanthus <i>Poiss</i>	Marrubiastrum, <i>Mön.</i>	Lagopsis, <i>Bunge.</i>
Sideritis, <i>L.</i>	Empedoclia, <i>Faf.</i>	Craniotome, <i>Rehb.</i>
Hesiodia, <i>Mön.</i>	Navicularia, <i>Fab.</i>	

SUB-TRIBE 4. LAMIIDÆ.—*Stamens extending beyond the tube of the corolla. Calyx tubular, campanulate, or funnel-shaped, five to ten toothed, equal or oblique, very rarely distinctly two-lipped.*

GENERA AND SYNONYMS.

Anisomeles, <i>R. Br.</i>	Trixago, <i>H. & L.</i>	Pollichia, <i>Roth.</i>	Ostostegia, <i>Benth.</i>
Colquhounia, <i>Wall.</i>	Galeopsis, <i>L.</i>	Erianthera <i>Benth</i>	Leucas, <i>Benth.</i>
Achyrosperrum, <i>Bl</i>	Tetrahit, <i>Dill.</i>	Moluecella, <i>Benth.</i>	Lasioecorys, <i>Benth.</i>
Siphotoxis, <i>Boj.</i>	Leonurus, <i>L.</i>	Molucca, <i>T.</i>	Leonotis, <i>R. Br.</i>
Lamprostachys,	Cardiaca, <i>Mön.</i>	Chasmonia, <i>Prsl.</i>	Phlomis, <i>R. Br.</i>
[<i>Boj.</i>	Chaiturus, <i>Mön.</i>	Lagochilus, <i>Bunge.</i>	Phlomidopsis,
Chamæsphecos,	Panzeria, <i>Mön.</i>	Roylea, <i>Wall.</i>	[<i>Link.</i>
[<i>Schrenk.</i>	Wiedemannia <i>F&M</i>	Ballota, <i>Benth.</i>	Phlomoides, <i>Mön.</i>
Betonica, <i>T.</i>	Lamium, <i>Benth.</i>	Beringeria, <i>Nock.</i>	Notochate, <i>Benth.</i>
Stachys, <i>L.</i>	Orvala, <i>L.</i>	Pseudodietamnus	Ercmostachys, <i>Bnge</i>
Zietenia, <i>Gled.</i>	Galeobdolon,	[<i>Mön.</i>	Ereophyton, <i>Bnth.</i>
Eriostomum <i>H&L</i>	[<i>Huds.</i>		
Tetrahitum, <i>H&L</i>			

TRIBE 6. PRASIÆ.—*Stamens four, under the helmet, parallel, ascending. Calyx nearly equal. Nuts fleshy, berry-like, often laterally somewhat connate at the base, and fixed obliquely.*

GENERA AND SYNONYME.

Gomphostemma, <i>Wall.</i>	Stenogyne, <i>Benth.</i>	Prasium, <i>L.</i>
Phyllostegia, <i>Benth.</i>	Phæopsis, <i>Nutt.</i>	

TRIBE 7. PROSTRANTHERÆ.—*Nuts commonly reticulately rugose, connate at the base, with a somewhat persistent style. Throat of the corolla campanulate; lobes flat.*

GENERA AND SYNONYMS.

* *Anthers four, two-celled.*

Chilodia, <i>R. Br.</i>	Cryphia, <i>R. Br.</i>	Prostranthera, <i>Labill.</i>
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** *Anthers four, dimidiate.*

Hemiandra, <i>R. Ur.</i>	Hemigenia, <i>R. Br.</i>	„ Colobandra, <i>Bartl.</i>
	Atelandra, <i>Lindl.</i>	

_ *Anthers two, dimidiate, the two sterile ones two-cleft.*

Microcorys, *R. Br.*
Anisandra, *Bartl.*

Westringia, *R. Br.*

TRIBE 8. *Ajugeæ*.—Nuts reticulately rugose, somewhat connate at the base. Stamens parallel, ascending. Upper lip of the corolla sometimes very short, sometimes cleft, very rarely arched; lobes declinate.

GENERA AND SYNONYMES.

Amethystea, L.
Isanthus, Mich.
Trichostemma, L.
Teucrium, L.

„ *Chamædrys, T.*
Scorodonia, T.
Polium, T.

Polidendron,
[*Webb.*]
Ajuga, Benth.

Phleboanthe, Tau
Bugula, T.
? *Cymaria, Benth.*

GEOGRAPHICAL DISTRIBUTION.—These are spread over the whole world, but are most abundant in temperate regions, diminishing in numbers towards the poles and the tropics; south of the tropics they are rare, and from the arctic regions of both hemispheres they are wholly excluded.

PROPERTIES AND USES.—The whole family is remarkable for a strong, penetrating odour, which has obtained for them the name of aromatic plants. This fragrant and aromatic principle is due to a volatile oil, analagous to camphor, abundantly contained in the numerous glands which exist in every part of the plants. Another principle, of a gum-resinous nature, is also found in them, which gives a bitter taste, and which is sometimes very marked, as in Germander. According as one of these principles predominates, the properties of the Labiates differ. Where the essential oil prevails, they are then aromatic and stimulant, diffusing throughout the animal system a general excitement, which is sometimes directed to the organs generally, but at others with special action to one organ in particular. Thus it is that they are either emmenagogue, sudorific, or antispasmodic, &c. In this class are found the greatest number of genera, and more particularly Sage, Thyme, Savory, Marjoram, Lavender, Mint, Rosemary, &c. If, however, the aromatic principle is very feeble, while the bitter is very strong, the properties are changed, and the plants become simply tonics, with a slower, less intense, but more durable action, which is concentrated on the stomach. Many of them are used as aromatic herbs in cookery.

The *Sweet Basil* of the gardens is *Ocimum basilicum*, a native of India and Africa, and hence it requires to be raised on a hotbed in this country. The plant is cultivated with us as one of the aromatic herbs for seasoning soups and dishes with its peculiar flavour, which resembles that of cloves. In India the seeds are considered soothing and refreshing, and are administered, in decoction, for gonorrhœa, heat of the urine, and nephritic affections. Horsfield says, that in Java it is employed as a stimulant. In Persia the seeds are soaked in water, then beaten up with ice, and given as a cooling drink during the excessive heats of summer. In Egypt the leaves are used as a condiment. The women of India employ the seeds of *O. pilosum*, the infusion of which is mucilaginous, to relieve after-pains, and the whole plant is commonly used as a condiment. The *Bush Basil*, cultivated in gardens, is *O. minimum*, a native of Chili. It also is used for

seasoning in this country, and in France is a great favourite as a window plant, as much as southernwood is with the common people in this country; and for this purpose its pretty close habit well adapts it. *O. canum* and *O. gratissimum* are both very aromatic, and are prescribed in Brazil as sudorifics and diuretics after chills, under the name of *Remedioldi vaqueiro*. Molini states that there is in Chili a remarkable species, which he calls *O. salinum*, because of the property it possesses of producing every day drops of salt water, which is employed as common salt. *O. guineense* is very much employed by the negroes medicinally, particularly in bilious fevers; and in India the native physicians prescribe the infusion of *O. hirsutum* against diarrhoea in children during teething; and that of the root of *O. sanctum* against fevers; the juice of the leaves is also given in catarrhal affections. The Brahmins regard this plant as sacred to Vishnu, and use it in their funeral ceremonies. The Malays also strew it over the graves of their dead. *O. tenuiflorum* is regarded as an aromatic stimulant in Java. The leaves of *O. album* have a pleasant taste and smell, and in India the juice is given to children for colds. The dried leaves are used as a substitute for tea, as are also those of *O. erispum* in Japan, as a drink for colds. The latter plant, when boiled, yields a red decoction, with which the Japanese frequently give a red colour to black radishes and turnips. *Coleus* (*Ceimum*) *zaturendhi* is used in India as a perfume and a condiment; and *C. aromaticus*? (*Plectranthus amboinensis*) is employed in Cochin China as a tonic cephalic, and in asthma, chronic coughs, and epileptic and convulsive affections. *Æolanthus suavis* is used in Brazil in spasmodic stranguary. Many species of *Hyptis* are diuretic and diaphoretic.

Lavendula stæchas, or *French Lavender*, is a native of the South of Europe and North of Africa. It is very fragrant, and, rubbed between the fingers, it emits the odour of camphor, because its essential oil contains much *Stearoptine*, or *Serensine*, which is the crystallizable principle of essential oils. The plant is considered useful in mucous catarrh, humid asthma, pulmonary affections with atony, and as an emmenagogue. It has also been regarded as a good anti-spasmodic, particularly in certain nervous conditions of the stomach, such as nervous vomiting. The flowering tops are drunk in the form of infusion. The *True Lavender*, or *Narrow-leaved Lavender* (*Lavendula vera*), is that which is so commonly grown in gardens. It is originally from the South of Europe, where it grows abundantly on barren hills and declivities. The whole plant is bitter and aromatic, with warming and exciting properties. It is tonic, cephalic, stimulating to the nervous system, and good against diseases of debility, such as disordered stomach, intestinal flatulence, passive hemorrhages, leucorrhœa, and some gonorrhœas. From the flowers and flower-stalks an essential oil is obtained by distillation, which, however, is always of superior quality when taken from the flowers alone. *Oil of Lavender* is very fluid, of a lemon-yellow colour, having the odour of the flowers, and an aromatic, burning taste. The oil of lavender is chiefly used as a perfume, though possessed of carminative and stimulant properties; a few drops in drinks is beneficial against some nervous diseases, hysteria, tremblings, vertigo, catalepsy, stammering, and paralysis, for which it is said to have a great reputation. It furnishes a perfume known as *Huile antique de lavande*, which is com-

posed of three ounces of the essential oil, added to one pound of the oil of ben; and it is one of the ingredients of Eau de Cologne. *Lavender Water* is obtained by distilling the flowers of lavender with diluted alcohol. The dried flowers and flower-stalks are frequently tied in bundles, and kept in wardrobes for their fine perfume. The plant is extensively cultivated in Surrey for the flowers. *L. spica* is *Broad-leaved Lavender*, and is also a native of the South of Europe, and North of Africa, where it grows along with the preceding species. It is from the flower of this that the *Oil of Spike*, or *Aspic*, is obtained. It is yellowish, aerid, warm, aromatic, and of a penetrating odour; used in the arts for making varnishes, by artists for painting on porcelain, and also in medicine. It is sometimes adulterated with oil of turpentine, and sometimes with alcohol. Its specific gravity is 0.9206. When allowed to stand in imperfectly-stopped bottles it deposits stearoptine, which often amounts to one-fourth of the weight of the oil. In Provence blotting-paper is soaked in the oil, and applied to the heads of children, to destroy pediculi; and it is also employed in friction against paralysis.

The celebrated perfume called *Patchouli*, or *Puchá Pát*, is obtained from *Pagostemon patchouly*, a plant growing abundantly in Penang, and on the opposite shore of the Malayan peninsula. It is largely imported into India by Mogul merchants, and it is used as an ingredient in tobacco for smoking, and for scenting the hair of women; the essential oil is in common use for imparting the peculiar fragrance of the leaf to clothes, among the upper classes of the natives. The Arabs use and export it more than any other nation, and their annual pilgrimage takes up an immense quantity of the leaf. They use it principally for stuffing mattresses and pillows, and assert that it is very efficacious in preventing contagion, and prolonging life. It requires no sort of preparation, being simply gathered and dried in the sun; too much drying, however, is hurtful, inasmuch as it renders the leaf liable to crumble to dust in packing.

Spearmint, or *Green-mint*, is *Mentha viridis*, a native of Britain, in marshy places. The plant has a strong, aromatic odour, with a warm, and slightly bitter taste, which is less pungent, but more agreeable than that of peppermint. The young leaves and tops are used in soups, and as an ingredient in certain dishes; with green peas they form a general accompaniment. The properties of the plant depend on a volatile oil, obtained by distillation. *Oil of Spearmint* is pale yellow or greenish, when fresh, but becomes darker with age, and ultimately of a mahogany colour; it is used for the same purposes as oil of peppermint. Its specific gravity is 0.975, and its boiling point 320 degrees. *Peppermint* (*M. piperita*) is also a native of Britain. The plant has a warm, pungent, and camphorous taste, leaving a remarkably cold sensation in the mouth. Its odour is very strong, balsamic, and penetrating, particularly when touched, and which it does not lose, even in drying. Peppermint is stimulant and aromatic, and is good against spasmodic pains of the bowels, nausea, and flatulence. Its properties are owing to the presence of a large quantity of volatile oil which it contains, and is obtained by distillation. *Oil of Peppermint* is greenish-yellow, and has a strong aromatic odour, with a warm, camphorous, and very pungent taste. Its specific gravity is 0.920, and its boiling point 365 degrees. It is often adulterated with alcohol, and even with oil of turpentine; combined with alcohol, it forms *Essence of Peppermint*, and it

is used medicinally as a carminative and stimulant, as well as in confectionary, for flavouring bon-bons. *Peppermint Water*, obtained by distillation, is very much employed in tonic, cordial, and anti-spasmodic drinks. *Bergamot Mint* (*M. citrata*) has an odour of citron or lemon. *Pennyroyal*, or *Fleamint* (*M. pulegium*), is a native of Britain, in ditches, bogs, and marshy places. It has the taste, smell, and properties of the other mints, and enjoys a high popular reputation as an emmenagogue, but very little dependence is to be placed in its efficacy. The mints have almost all the same properties, and it will be needless for us to occupy time in noticing any more of the species; but there is one common in the West Indies, and particularly in Cuba, known in that country under the name of "balm," and cultivated in gardens as a remedy against tape-worm; and there is one in Chili very commonly employed against melancholy, and called *Polao*.

A common plant by the sides of ditches, and in marshy places in Britain, is the *Water Horehound* (*Lycopus europæus*). This has been used from time immemorial, by the agricultural population of Piedmont, as a certain febrifuge, and on that account is called *Erba china*. It has been proved to cure intermittents, when administered in doses of two drachms, in powder; and it is also regarded as an astringent. It dyes black, and gives a permanent colour to linen, wool, and silk; and it is said that gipsies stain their skin with it. *L. virginicus*, a native of the United States, and there called *Bugle-weed*, is said to be astringent, and has been used with advantage in incipient phthisis, and hemorrhage of the lungs, by diminishing the frequency of the pulse, quenching irritation, and allaying cough. *Cunila mariana* is employed in South America as a febrifuge.

Origanum dictamnus, called *Dittany of Crete*, is a favourite window-pot plant; its purple trailing stems, round leaves, covered with thick white down, its red bracts and flesh-coloured flowers, rendering it a pretty ornament. It has a bitter, slightly aromatic taste, a sweet, strong, and penetrating odour. It furnishes an acrid, aromatic, essential oil. The plant is tonic and excitant, and is highly prized as a promoter of digestion, emmenagogue, and strengthener of the nervous system. *Common Marjoram* (*O. vulgare*) is found plentifully in Britain by waysides, in hedges, and in woods. The whole plant is aromatic, with a bitter and slightly acrid taste. It is tonic, sudorific, emmenagogue, stomachic, and anti-spasmodic. The dry leaves are used instead of tea, which is said to be extremely grateful, and they are also used in fomentations. The tops dye linen a reddish brown, and, put into beer, prevent it from turning sour. The plant yields, by distillation, a volatile oil, called *Oil of Marjoram*, or *Oil of Origanum*, which is of a yellow colour, with the odour of the plant, and a hot, acrid taste. Its specific gravity is 0.867; it deposits a considerable quantity of stearoptine, and, dropped on a piece of cotton, and applied to a decayed tooth, it has given relief in toothache. *O. heracleoticum* is the *Winter Sweet Marjoram*, and is cultivated in gardens as an aromatic herb for soups, dishes, and stuffing. *Sweet*, or *Knotted Marjoram* (*O. majorana*), so much cultivated in gardens as an aromatic herb, is a native of the North of Africa. It has an agreeable and very pleasant odour, and an aromatic, somewhat bitter taste, and is considered tonic, excitant, and anti-spasmodic. *O. onites*, also a native of the shores of the Mediterranean, is *Pot Marjoram*, and is cultivated as an aromatic culinary herb. *Common Thyme*

(*Thymus vulgaris*), such as is grown in gardens as an aromatic herb, is a native of the south of Europe, and is quite a different plant from the Wild Thyme of this country. There is a variety of it, called *Lemon Thyme*, which has a strong scent of lemons. *Wild Thyme* (*T. serpyllum*), or, as it is sometimes called, *Mother of Thyme*, is found abundantly on the commons, moors, and mountains of Britain. Of this I have met with a lemon-scented variety, by the side of the old Roman road from Winchester to Sarum. Wild Thyme has not such a powerful odour as the other, but both are pungent and aromatic. They yield, by distillation, an oil, called *Oil of Thyme*, which is of a greenish-yellow colour, and its specific gravity is 0.905. The plants have all the aromatic properties of the other Labiates. The flowers are very much frequented by bees, who seem to reap an abundant harvest from them. *T. capitatus* grows abundantly in the East. It is the thyme of the ancients, which they used as we do the common among us; bees are remarkably fond of it, and it is the plant which communicates the fine flavour to the honey of Mount Hymettus.

Garden, or Summer Savory (*Satureia hortensis*), is another of the garden aromatic herbs, employed in giving flavour to soups and dishes. It has a powerful aromatic odour, and a warm, bitter taste. Ferrein says that the leaves are sometimes covered with small corpuscles, which he found to be camphor, but which doubtless was stearoptine. The plant has the reputation of being stomachic, digestive, tonic, vermifuge, and carminative. *S. montana* is *Mountain, or Winter Savory*, and is cultivated for the same purposes as the preceding. *Small Calamint* (*Calamintha nepetha*), or *Field Balm*, is a common plant on chalky soils in Britain. It has a strong aromatic smell, like pennyroyal, and a pungent taste somewhat like spearmint, but warmer. It is considered stimulant; and, Haller says, if applied to the skin for a considerable time, it will raise vesicles. *Calamint, or Mountain Balm* (*C. officinalis*), is also a native of Britain, by waysides, in hedges and woods, on chalky soils. The plant has aromatic, tonic, excitant, and cordial properties. It is one of the plants used for herb tea, and its properties are similar to those of Balm. *Common Balm* (*Melissa officinalis*) is a native of the South of Europe. When in the full vigour of its growth, the plant has a strong lemon scent, particularly when rubbed, and hence it has been called *Citronelle* in France; but in its more advanced state it acquires the smell of bugs. The plant has a bitter, aromatic, and slightly warm taste, and hence the properties assigned to it have been those of a cordial, stomachic, and carminative. It loses its odour by drying, and is of but little use except for making a simple tea, which forms a grateful drink in fevers. The oil it contains is of small quantity, and only sufficient to communicate its flavour to the infusion. *Hedeoma pulegioides* is common all over the United States, and is the *American Pennyroyal*. It has a pleasant aromatic smell, and a warm, pungent, mint-like taste. It is used as a stimulant aromatic; in the state of a warm infusion, it promotes perspiration, and is popularly regarded as an emmenagogue of certain action. *Hyssop* (*Hyssopus officinalis*) is a native of the south of Europe and the East. It has a strong aromatic odour, and a warm, pungent taste. The leaves and young shoots are occasionally used as a pot-herb, and the leaves and flowering tops are dried for medicinal purposes. Hyssop is a gently stimulant aromatic, and its infusion is employed in chronic catarrhs and

disorders of the breast and lungs. Its virtues depend on an essential oil, which is obtained by distillation, and which is sometimes employed instead of the plant. It was long supposed that this was the hyssop of Scripture; but it has now been very satisfactorily shown that the plant there mentioned is *Capparis spinosa*, or the caper (see page 71).

Common Sage (*Salvia officinalis*), so much cultivated in gardens as an aromatic herb for flavouring sauces, dishes, and other articles of cookery, is originally from the south of Europe, and is a plant possessed of active properties, as its very aromatic odour and powerfully bitter taste indicate. It is the leaves and flowering tops which are generally employed, in the form of tea, which is considered tonic and astringent; but its reputation is not now so high as formerly. As a gargle with vinegar, or honey and alum, it is a valuable remedy in inflammation of the throat and relaxation of the uvula. In some parts of the continent the leaves are smoked like tobacco, and used as a substitute for tea. The plant abounds in a volatile oil, which is prescribed in doses of two to ten drops, and is an ingredient in liniments against rheumatism. The oil contains a great deal of stearoptine. *S. sclarea* is grown in gardens, under the name of *Clary*, for seasoning soups. The whole plant has a very agreeable odour, resembling that of the balsam of tolu, and therefore it is used in Austria as a perfume; in confectionery, and to the jellies of fruits, it communicates the flavour of pine-apple. It is said that, when infused in white wine, it gives it the flavour of muscat; and has antispasmodic and cordial properties. *S. pratensis*, a common plant in Britain, has the same stimulating properties as common sage. *S. pomifera* is a native of Greece and the East. An insect perforates the leaves of this species, and causes them to develop excrescences as large as gall-nuts. Belon says, that on Mount Ida, in Crete, the peasantry collect bags full of these nuts, or *Baisonge*, as they are called, and sell them in the neighbouring towns; they are sweet and good to eat, and with sugar or honey they make an excellent sweetmeat.

Rosemary (*Rosmarinus officinalis*) grows wild in the South of Europe, along the region of the Mediterranean, on dry hills and among rocks. The plant has a strong aromatic odour, and a bitter, camphorous taste, both of which are imparted to alcohol, and only partially to water. As a medicine, Rosemary is tonic, exciting, stimulates the nervous system, cordial, cephalic, and promotes the circulation. It is considered serviceable in vertigo, hysteria, headaches, hypochondria, paralysis, humid catarrh, and all the affections of debility,—as certain chloroses, leucorrhœas, and also as an emmenagogue. It is sometimes used in the form of snuff, or mixed along with other herbs for the same purpose. The whole plant is employed as a condiment; powdered, it serves many purposes in confectionery, and to form fragrant packets for perfuming wardrobes and clothing. The virtues of the plant reside in a volatile oil, obtained by distillation, and called *Oil of Rosemary*, which is colourless, and has the odour of the plant. Its specific gravity is 0.911. When kept in imperfectly-stopped bottles, it deposits stearoptine equal to one-tenth of the bulk of the oil. This oil is much employed in perfumery, for the manufacture of toilet-waters and scents, among which it is an ingredient in Hungary water and Eau de Cologne; and it is said positively to have the property of encouraging the growth of the hair, and curing baldness. The flesh of sheep that browse upon the plant con-

tracts an excellent flavour, and the celebrated white honey of Narbonne owes its reputation to being collected from the flowers of Rosemary; indeed, De Caudolle asserts, that when by any accident the flowering of the Rosemary is checked, the honey harvest of Narbonne is a failure. *Monarda didyma*, a native of the United States, is called *Oswego Tea*, because it is so used by the inhabitants of Oswego. The leaves emit a very grateful and refreshing odour, and the plant is used in the same way as chamomile in intermittents. *M. fistulosa* is bitter, tonic, antispasmodic, and used in the United States against intermittent fevers. *M. punctata*, or *Horsemint*, grows abundantly about Philadelphia, and is employed against nausea, flatulence, and vomiting in bilious fevers. It yields a great quantity of volatile oil, which contains much stearoptine.

Catmint or *Catnep* (*Nepeta cataria*) is remarkable for the singular influence it has upon cats. It is a common plant in England, especially on chalky or gravelly soils. When it is withered, cats will roll themselves on it, tear it to pieces, and chew it with great pleasure. Ray observed that plants which he transplanted from the fields to his garden were always destroyed, unless protected by thorns until they had taken root and come into flower, but that they never touched those raised from seed. The peculiar scent which is emitted by being bruised, is supposed to act on these animals as an aphrodisiac. The plant is very aromatic, bitter, and acrid, and the infusion has a popular reputation in amenorrhœa, chlorosis, hysteria, and flatulent cholæ of infants. *N. glechoma* (*Glechoma hederacea*), or *Ground Ivy*, is a pretty little trailing plant, growing abundantly in Britain in hedges, ditches, woods, and waste places. The leaves were formerly thrown into the vat with ale, to clarify it and give it a flavour; this was called gill-ale, ground ivy being called *gill* or *gell*. From this circumstance it was called *ale-hoof* and *tun-hoof*. The plant has a strong smell, and a bitterish, somewhat aromatic taste, and is supposed to be gently stimulant and tonic, aperient, diuretic, and corroborant, with a particular tendency to the lungs and kidneys. It is a popular remedy in coughs, pulmonary complaints, and affections of the urinary organs. *Prunella vulgaris*, or *Self-heal*, is a common weed in this country. It is mildly aromatic and slightly astringent, and was formerly used in diarrhœa and gargles. *Scutellaria galericulata*, or *Common Scull-cap*, a common plant by the sides of ditches, ponds, and rivers in Britain, was formerly held in high reputation for the cure of intermittents, and, applied externally, it was supposed to be useful in old ulcers, but it is now abandoned. *Common Horehound* (*Marrubium vulgare*) grows abundantly by way-sides and among rubbish. It has a strong, disagreeable, and even fetid odour, and a bitter, nauseous, slightly acrid taste. Like most of the fetid bitters, it has tonic and excitant properties on the uterine system; thus Horehound is employed as an emmenagogue, and to dissipate nervous affections and hysteria. On account of its bitter and slightly acrid qualities, it has been prescribed in catarrhal affections of the chest. In large doses it is aperient. *Anisomeles malabarica*, a native of the East Indies, is called *Malabar Catmint*. Agree patients are made to inhale the vapour arising from an infusion of this plant, which causes copious perspiration. The leaves are bitter, astringent, and somewhat aromatic; they are given in infusion in the last stages of dysentery, and in intermittent fevers. The juice expressed from the slightly-warmed leaves

is prescribed for children in fever from dentition. The entire plant is deemed emmenagogue in the West Indies. The roots of *Common Betony* (*Betonica officinalis*) are very bitter and nauseous, and, in small doses, act as an emetic and aperient; the dried leaves cause sneezing. The plant dyes wool of a fine dark yellow colour. The tubers of *Stachys palustris*, called *Marsh Wound-wort*, or *Clown's All-heal*, contains a large quantity of nutritive fecula, which is made into bread in the north of Europe in times of scarcity, and from which starch can be obtained; these were called by the old writers *panax colona*; the underground stems are of the size of small asparagus, and are eatable. Linnæus says, swine are fond of the roots. *S. sylvatica*, or *Wild Hedge Nettle*, is pungent, with a fetid smell approaching that of black horehound; and Sir J. E. Smith suggests that, being one of those plants that powerfully affect the nerves, it might prove no contemptible stimulant if judiciously used. *Lamium purpureum*, or *Purple Archangel*, is boiled in Sweden as a pot-herb, as are also those of *L. album*, which was formerly regarded as an astringent, and useful in hemorrhages and leucorrhœa. *Black or Stinking Horehound* (*Ballota nigra*) has a strong, disagreeable odour, and was formerly administered in hysteria and other nervous affections. *B. lanata* is employed both internally and externally, in Sweden, against headache; and it is said to have acted with success in cases of dropsy. *B. suaveolens* is used in aromatic baths in St. Domingo. The fruit of *Leucas martinicensis*, a native of New Guinea, bruised with lemon juice, are used in some parts as a local application against inflammations. *L. zeylanica* is the plant called by Rumphius *Herba admirationis*, and which is regarded in India as cordial, febrifuge, salivary, and sternutatory; it is sent by the natives to the objects of their affection. *Leonotis nepetæfolia* is used in Brazil against rheumatism, as a sudorific under the name of *Cordao do frade*. In Siberia the inhabitants apply the root of *Phlomis tuberosa* to enlarged glands of the groin, and the tubers are eaten by the Calmucks of the Caspian sea after being reduced to powder; they call the plant *Bedmon*.

Wood Germander, or *Wood Sage* (*Teucrium scorodonia*), grows abundantly in Britain in woody, hilly situations, among bushes, and under hedges. The plant is bitter, slightly aromatic, and both smell and taste much resemble those of hops. In Jersey it is called *Ambroise*; and in seasons when cider fails, the people malt their barley at home, and instead of hops use the common ambroise of the hedge with much advantage. *T. scordium*, or *Water Germander*, has a bitter, pungent taste, with a strong, disagreeable odour like garlic. The powdered leaves destroy worms. *T. chamædrys*, or *Common Germander*, is esteemed chiefly as a mild aperient and corroborant in uterine, rheumatic, gouty, and scrofulous affections, and intermittent fevers. It formed an ingredient in the once celebrated gout medicine called *Portland powder*, which consisted of equal parts of the roots of *Aristolochia rotunda* and *Gentian lutea*, the tops and leaves of *Teucrium chamædrys* and *Erythraea centaurium*, and the leaves of *Ajuga chamæpitys*. *T. marum*, or *Cat Thyme*, comes from the south of Europe. The leaves and younger branches, when fresh, on being rubbed between the fingers, emit a volatile oil which causes sneezing. They are acrid, bitter, and warm to the taste, and their aromatic, camphorous odour has the same effect on cats as that of catmint. The plant possesses stimulant, tonic,

aromatic, and deobstruent qualities. It is often used as a sternutatory, and, reduced to powder and snuffed up the nose, it has proved an excellent remedy against polypus. The leaves of *T. thea* are diuretic, attenuant, and deobstruent, and are used by the natives of Cochin China, in infusion, to facilitate digestion; they call the plant, tea. *Ground Pine* (*Ajuga Chamepitys*) is not common in England. The leaves have a strong, resinous, and not disagreeable odour, and a bitter balsamic taste; and they yield, by distillation, a volatile oil resembling turpentine. They are said to be stimulant, diuretic, and aperient, and have been given in rheumatism, gout, palsy, and amenorrhœa.



Fig. 175. *Menarda amplexicaulis*.

ORDER CXLVII.—VERBENACEÆ—VERVAINS.

TREES or shrubs, rarely herbs. *Leaves* generally opposite, rarely alternate, simple, sometimes compound. *Flowers* hermaphrodite, regular or irregular, arranged in spikes or corymbs. *Calyx* permanent, tubular, or bell-shaped, and unequally lobed. *Corolla* tubular, frequently two-lipped, with four or five more or less unequal lobes. *Stamens* four, two long and two short, sometimes two, and rarely five; *anthers* two or one-celled. *Ovary* superior, with one, two, to four cells, often subdivided by a membrane into two secondary cells; cells containing one or two ovules attached towards the superior part. *Style* terminated by a simple or two-lobed stigma; oblique and one-sided in the genera, having two one-ovuled cells. *Fruit* a drupe, with one, two, or four one or two-celled nuts; or a berry with two or four one-seeded cells. *Seeds* erect, ascending or pendulous, with or without fleshy albumen. *Embryo* straight; radicle either inferior or superior.



Fig. 176. A, Flower of *Verbena Aubletia*; B, corolla laid open; C, calyx; D, pistil; E, vertical section of a nut; F, the fruit; G, section of ditto; H, a seed; I, embryo.

SUB-ORDER I.—VERBENACEÆ.

Embryo with an inferior radicle.

TRIBE 1. *Verbeneæ*. — Inflorescence indefinite. Ovary two or four-celled. Ovules erect from the base of the cell, anatropal. Seeds without albumen.

SUB-TRIBE 1. *SPIELMANNIDÆ*.—*Flowers* solitary in the axils of the leaves. *Calyx* five-parted. *Drupe* containing a two-celled, bony nut. *Natives* of the Cape.

GENUS AND SYNONYME.

Spielmannia, L.
Ostia, Ad.

SUB-TRIBE 2. *MONOCHILIDÆ*.—*Racemes* loose-flowered. *Calyx* somewhat two-lipped. *Corolla* tubular, one-lipped. *Drupe* somewhat fleshy. *Natives* of Brazil.

GENUS.

Monochilus, Fisch. & Meyer.

SUB-TRIBE 3. CASSELIDÆ.—*Racemes axillary, few-flowered. Calyx tubular. Corolla funnel-shaped. Drupe somewhat fleshy. Herbs or shrubs of tropical America.*

GENERA AND SYNONYMES.

Casselia, Nees. & Mart.	„ Leptocarpus, W.
Tamonea, Aubl.	Kæmpferia, Houst.
Ghinia, Schreb.	Ischnia, DC.

SUB-TRIBE 4. VERBENIDÆ.—*Racemes, spikes, or heads, terminal and axillary. Calyx campanulate or tubular. Corolla tubuloso-salver-shaped, with the limb oblique, somewhat two-lipped, or gaping. Capsule separating into two or four nuts, when ripe. Herbs or shrubs.*

GENERA AND SYNONYMES.

Mallophora, Endl.	Verbena, L.	Chascanum, E.M.	„ Dipteroealyx,
Chloanthes, R. Br.	Glandularia, J.	Pleurostigma,	[Cham.
Priva, Ad.	[F. Gmel.	[Hochst.	Zapania, Scop.
Bleria, Gärt.	Billardiera, Mön.	Stachytarpha, Vahl	Bertolonia, Raf.
Tortula, Roxb.	Shuttleworthia,	Abena, Neck.	Platonia, Raf.
Streptium, Roxb.	[Meisn.	Cymburus, Sal.	Riedelia, Cham.
Castelia, Cav.	Uwarovia, Bnge.	Melananthus, Ph.	Cryptocalyx, Bth.
Dipyrena, Hook.	Bouchea, Cham.	Lippia, L.	Aloysia, Orteg.
Wilsonia, Hook.			

SUB-TRIBE 5. LANTANIDÆ.—*Flowers in heads, or in a close spike. Calyx shortly tubular, membranaceous. Corolla tubuloso-salver-shaped, limb oblique, somewhat two-lipped. Drupe with two bony nuts, which are each one-celled. Shrubs, mostly natives of America.*

GENUS AND SYNONYMES.

Lantana, L.	„ Carachera, Forsk.
Cammaria, Plum.	Myrobatindum, Vaill.

SUB-TRIBE 6. DURANTIDÆ.—*Flowers in a loose raceme. Calyx tubular, or wine-glass-shaped. Corolla salver-shaped, or bell-shaped. Drupe with two or four bony nuts; nuts two-celled. American shrubs.*

GENERA AND SYNONYMES.

Citharexylum, L.	Poppigia, Bert.	„ Ellisia, P. Br.
Rauwolfia, R. & P.	Duranta, L.	Castorca, Pl.

SUB-TRIBE 7. PETREADÆ.—*Flowers in a loose raceme. Calyx wine-glass-shaped, five-petalled, enlarged, and involucred by a large five-leaved, coloured, epicalyx adnate with it beneath. Capsule coriaceous, unopening. Mostly American climbing shrubs.*

GENUS.

Petrea, Houst.

TRIBE 2. Viticæ.—*Inflorescence definite, in a two or three-forked cyme. Ovary four-celled. Ovules inserted above the base, in the central angle of the cell, pendulous, amphitropal, or somewhat anatropal. Seeds without albumen. Twining shrubs, natives of India.*

SUB-TRIBE 1. SYMPHOREMIDÆ.—*Cymes contracted, few-flowered, involucred. Capsule leathery, unopening, one-seeded by abortion. Twining shrubs natives of India.*

GENERA AND SYNONYMS.

Symphorema, Roxb.	Sphenodesma, Jack.	Adelosa, Bl.	„ Roscoea, Roxb.
Analectis, Juss.	Viticastrum, Prl.	Congea, Roxb.	Calochlamys, Prl.

SUB-TRIBE 2. CARYOPTERIDÆ.—*Cymes not involucred. Capsule, when ripe, separating into two carpels. and then again separate through the valves into two parts. Asian shrubs.*

GENERA AND SYNONYMS.

Caryopteris, Bunge.	Mastacanthus, Endl.	Hymenopyramis, Wall.
Barbula, Lour.	Glossocarya, Wall.	Percnema, Jack.

SUB-TRIBE 3. VITICIDÆ.—*Cymes not involucred. Drupe succulent, fleshy, rarely nut-like, and not fleshy. Trees and shrubs.*

GENERA AND SYNONYMS.

Pityrodia, R. Br.	Geunsia, Bl.	Cyclonema, Hochst.	Psilogyne, DC.
Tectona, L. f.	Ægiphila, Jacq.	Spiromema, Licht.	Chrysomallum,
Theka, Rhede.	Manabea, Aub.	Oxera, L. b.	[Thou.
Jatus, Rumph.	Omphalococca, W	Oncoma, Sp.	Pyrostoma, FWM
Premna, L.	Volkameria, L.	Amasonia, L. f.	Cassarettoa Walp
Cornutia, Burm.	Duglassia, Hout.	Taligalea, Aub.	Teucrium, Hook. f
Gumira, Rumph.	Clerodendron, L.	Gmelina, L.	Holmskioldia, Retz.
Holochiloma, Hch	Volkmannia Jacq	Michetia, Amm.	Hastingia, Sm.
Petitia, Jacq.	Agricollea, Schrk.	Cornutia, Pl.	Platinum, Juss.
Callicarpa, L.	Siphonanthus, L.	Hosta, Jacq.	Quoya, Gaud.
Eurchardia, Duh.	Ovieda, L.	Hostana, Pers.	Homigymnia, Griff
Johnsonia, Cates.	Valdia, Pl.	Vitex, L.	Scleroon, Benth.
Sphodylococcum,	Torreya, Sp.	Wallrothia, Roth.	Pentagonula, L.
[Mitch.	Cornacchiaia,	Limia, Vand.	Cochranea, Miers.
Porphyra, Lour.	[Savi.	Nephandra Colh	

TRIBE 3. Avicennæ.—Inflorescence capitate, or spicate, centripetal. Calyx with five segments. Corolla almost regular, four-cleft. Ovary two-celled. Ovules twin, pendulous from the apex, amphitropal. Capsule leathery unopening. Seeds with thin albumen. Embryo germinating in the capsule. Small trees, growing in masses on the muddy shores of the tropics.

GENERA AND SYNONYMS.

Avicennia, L.	„ Oepata, Rhedc.	„ Secura, Forsk.
Donatia, Löffl.	Upata, Ad.	Halodendron, Thouars.

TRIBE 4. Stilbæ.—Inflorescence in dense spikes at the points of the branches. Stamens four, sometimes with a fifth, which is always rudimentary, and frequently wanting, inserted in the corolla, and alternating with its lobes; anthers with the cells confluent. Ovary two-celled. Seeds erect, in the axis of fleshy albumen.

GENERA AND SYNONYMES.

Camphylostachys, <i>Kunth.</i>	Euthystachys, <i>A. DC.</i>	Luhea, <i>Schmidt.</i>
Stilbe, <i>Th.</i>	Stilbe, <i>Berg.</i>	Eurylobium, <i>Hochst</i>

SUB-ORDER II.—MYOPORINÆ.

Embryo with a superior radicle.

TRIBE 1. *Myoporeæ*.—Flowers in the axils of the leaves, or in heads. Stamens four, with sometimes a fifth, which is occasionally rudimentary; anthers with two cells, which are sometimes confluent. Fruit drupaceous. Seeds with albumen. Ovary one, two, or four-celled.

GENERA AND SYNONYMES.

Disoon, <i>A. DC.</i>	Spartothamnus,	Andrewsia, <i>Vent.</i>	Bontia, <i>Pl.</i>
Nesogenes, <i>A. DC.</i>	[<i>A. Cunn.</i>	Bertolonia, <i>Spin.</i>	Globularia, <i>L.</i>
Pseudopholidia,	Polycælium, <i>A. DC.</i>	Eremophila, <i>R. Br.</i>	Alypum, <i>T.</i>
[<i>A. DC.</i>	Pentacælium, <i>S&Z</i>	Eremodendron, <i>DC</i>	Abolaria, <i>Ad.</i>
Dasymalla, <i>Endl.</i>	Myoporium, <i>Banks.</i>	Pholidia, <i>R. Br.</i>	Carradoria, <i>A. DC.</i>
	Pogonia, <i>Andr.</i>	Stenochilus, <i>R. Br.</i>	

TRIBE 2. *Selageæ*.—Flowers in spikes, with large bracts. Stamens generally four, sometimes two; anthers one-celled. Ovary two-celled. Fruit membranous. Seeds with fleshy albumen.

GENERA AND SYNONYMES.

Polycenia, <i>Chois.</i>	Noltea, <i>Echl.</i>	Walafridia, <i>Walp</i>	Agathelpis, <i>Chois.</i>
Hebenstreitia, <i>L.</i>	Vormia, <i>Ad.</i>	Gosela, <i>Chois.</i>	Gymnandra, <i>Pall.</i>
Dischisma, <i>Chois.</i>	Maeria, <i>E. Mey.</i>	Mierodon, <i>Chois.</i>	Lagotis, <i>Gärt.</i>
Selago, <i>L.</i>	Walafridia, <i>E. Mey.</i>	Dalea, <i>Gärtn.</i>	Gerberia, <i>Stell.</i>

TRIBE 3. *Phrymaceæ*.—Stamens four; anthers two-celled. Ovary one-celled, one-ovuled. Fruit a seed-nut, one-seeded. Seed without albumen.

GENUS AND SYNONYME.

Phryma, *L.*
Leptostachya, *Mitch.*

GEOGRAPHICAL DISTRIBUTION.—The greatest number is found between the tropics, and rapidly diminishes towards the poles. The trees and shrubs of the family are met with in the warm regions, and the herbs are generally in the temperate. They are very rare in Europe, Asia, and North America, but plentiful in South America.

PROPERTIES AND USES.—These do not present any remarkable properties; they are generally bitter and odorous, and hence have been considered slightly excitant and astringent. Among the ancients *Common Vervain* (*Verbena officinalis*) was held sacred, because it was thought susceptible of producing enchantments. It was employed in making leagues by

ambassadors, and in sacrificial rites by the Druids. Hung about the neck as an amulet, it was supposed to be good against serpents and venomous bites. The leaves, bruised and applied as a cataplasm, is a popular remedy against headache; but the plant has not in reality any properties sufficiently marked to make it worth attention. The roots of *V. urticifolia* are bitter and astrigent, and, along with the bark of the white oak, the decoction, in milk and water, is used against erysipelas, caused by *Rhus toxicodendron*. *V. crenoides* is used by the Brazilian women as an emmenagogue. It is called *Sandialagnen* in Chili, and its infusion is there highly extolled as a diuretic and aperient. Feuillée says that it is given to assist parturition. It is said that *V. Aubletia*, a native of North America, contains so much mucilage, that it forms quite a jelly with the water in which it is boiled. The dried leaves of *Bouchea pseudo-gervao* are used as tea in Brazil, in the same way as *Stachytarpha jamaicensis*, a small shrub, growing in Brazil and South America, where it is called *gervao*, *urgevao*, and *orgibao*. It is regarded as a stimulant, febrifuge, and vulnerary; the juice, or the decoction of the leaves, is prescribed in cases of severe contusions, and the leaves are used to adulterate Chinese tea, besides being used alone for the same purpose; in Austria they are sold under the name of Brazilian tea. The expressed juice of the leaves, in doses of one or two tablespoonfuls, is used in the French West Indies as a cooling purgative for children. The leaves of *Lippia citriodora*, or *Lemon Scented Verbena*, have also been used as tea, and it has also been proposed to employ them in the flavouring of creams and other confections. The species of *Lantana* are indiscriminately called *Camara* in Brazil, and are used for strengthening baths, and in cutaneous diseases. Martius states that the flowers of many species, confounded under this name, are used in infusion, against catarrhal affections. The fruit of *L. annua* and *trifolia* are eatable. The leaves of *Congea villosa* have a disagreeable smell, and are used by the natives of India in fomentations.

The most valuable plant of this family is *Teak-wood*, or *Indian Oak* (*Tectona grandis*), a very large tree, from one to two hundred feet high, growing in the vast forests of Java, Ceylon, Malabar, Coromandel, Pegu, Ava, and Cochin China. The wood of this tree has been found by experience to be the most useful of all the woods in Asia; for, while it is light and easily worked, it is at the same time both strong, durable, and not liable to the attacks of insects. That which grows near the banks of the Godavery is very close-grained, beautifully veined, and particularly adapted for furniture, and other purposes where small timber is required. It is extensively employed for shipbuilding, for which it is better adapted than any other timber, being light, strong, and very durable, both in and out of the water. All the finest ships built in India, and many of those of first class which leave the Thames, are built of this timber. Pegu produces the greatest quantity, the large rivers enabling the natives to bring it down to the sea-ports at a cheap rate, from the mountains in the interior. The Teak-wood is a beautiful tree, rearing its lofty head high above all other vegetation, and with leaves twenty inches long, and sixteen broad. Rheede says that the fruit of this tree is employed as a substitute for the arca nut in the composition of betel, and that the powder of its bark is beneficial in moderating the heat of the bile. Rumphius states that, although the taste of the wood is ungrateful, it is employed in cases of cholera; that the

leaves are used as tea, but the infusion is nauseous and bitter. He also mentions that the Chinese and Malays make vessels of it to collect the rain-water during voyages, which has the property of facilitating the digestion of ships' provisions. The leaves dye red, with the aid of citric acid. The flowers are said to be diuretic. M. Perotel says there is a variety in Java the fruit of which is eatable. The roots of *Premna integrifolia* has a burning taste. Its leaves have a strong odour, and, according to Commer-son, when applied to the head, cure the headache: hence the tree has been called *Headache Tree*. A decoction of the root is used in India as a cordial and stomachic against fevers, colic, and flatulence. The flowers of *Callicarpa acuminata* are employed as a purgative and diaphoretic by the natives of New Grenada, near Henda, where this shrub grows. The Javanese employ *C. lanata* as an emollient, and the Cingalese chew it as a substitute for the leaves of betel; among the Malays the plant is reckoned diuretic. *Egiphila salutaris* has a nauseous odour, and, according to Humboldt and Bonpland, is used in decoction by the natives, on the banks of the Orinoco, near St. Thomas, against the bites of venomous serpents, whilst the bruised leaves are applied to the wound. The leaves of *Volkameria inermis*, a native of India, macerated in castor oil, are applied to burns, and the seeds are taken internally, as a remedy against poisoning. Dr. Ainslie says that the juice of the root and the leaves, which is bitter, is given with advantage in venereal and scrofulous diseases. Cinchona bark is frequently adulterated with that of *V. aculeata*. The juice of the leaves of *Clerodendron phlomoides* is bitter, and used in India against obstinate sores, which accompany some forms of syphilitic diseases. The roots of *Gmelinia asiatica* are mucilaginous and emollient. Loureiro states that the natives of Cochin China use it internally against pains of the joints, and apply the leaves to the diseased parts. Horsfield asserts that it is employed in Java as a tonic. The leaves of *G. parviflora* slightly bruised under water render it mucilaginous, which property the water retains till the mucilage is decomposed by fermentation. *G. arborea* is a large timber tree, growing in the mountainous districts of India. The wood is of a pale yellow colour, and has much resemblance to teak; it is light, easily worked, does not warp, is not liable to be attacked by worms, and is very durable, particularly under water, and hence it is much employed in the Vizagapatam districts for making foundations to buildings, walls, and similar structures. It is also used for picture-frames, the decks of small boats, palanquens panels, for making venetian blinds and grain measures.

The leaves of *Vitex trifolia*, a common Indian plant, are slightly bitter, but of a delightfully aromatic taste and smell, and are administered either in powder, as an electuary, or in decoction, for diseases of the skin and amenorrhœa; applied externally, they are considered a powerful remedy in rheumatism and intermittent fevers, contusions and glandular swellings. Sir. W. Jones states that the leaves are used to stuff pillows, and to cure catarrh and headache. The flowers, according to Dr. Hamilton, are prescribed in Behar, with honey, in fevers attended with vomiting and much thirst. *V. agnus castus*, or *Chaste Tree*, is a native of the shores of the Mediterranean, and is very abundant in the East. It receives its name from the practice of the Athenian matrons, who, in the sacred rites of Ceres, strewed their couches with it, or slept on beds stuffed with the leaves, for

the purpose of banishing impure thoughts, and it was regarded by the ancient physicians as an agent in securing chastity. Under this belief it was, and still may be, customary to make a syrup of the fruit, which is prescribed in convents with that intention, but which, in fact, if it has any virtues at all, are quite of an opposite character, being heating and stimulant, like the rest of the family. The fruits, which are small, resembling peppercorns, have a pleasant smell when dry and entire, but when bruised they emit an acrid, disagreeable odour, similar to that of stavesacre. They have an acrid, aromatic taste, resembling pepper, and contain a considerable quantity of essential oil, which possesses powerful stimulating properties. Forskahl states that, when powdered, strewed over a sliced onion, and applied to the stomach, they are a sure remedy against cholera. Mathioli says that they were eaten in Italy in desserts. The decoction of the root of *V. negundo* is a pleasant bitter, and is administered in India in cases of intermittent fever. The warm leaves are said to be a useful application in rheumatism and spasms, while a decoction of them is used as the warm bath for women after delivery. The Mohamedans smoke the dried leaves in cases of headache and catarrh. The fruit is small and black, like pepper, and is used as a condiment; it has an agreeable bitterness, and is prescribed in intermittent fevers, and as a vermifuge. The negroes are said to eat the fruit of *V. leucoxylon*. The bark of *V. Taruma* is used in Brazil against syphilitic affections, and the leaves of *Patagonia vulneraria* contain a great deal of mucilage, which renders them useful as an application in cases of inflammatory action.

Avicenna tomentosa grows among mangroves, in the mud of the shores of the tropics, and is used at Rio Janeiro for tanning. *A. officinalis* yields a green resin, which, according to Forster, furnished the natives of New Zealand with a kind of food which they called *Munaway*, but its use is now seldom heard of. The Avicennias live in salt swamps, and throw out creeping roots, which grow in an arched direction, sometimes six feet above the mud before they stick into it, and from these they throw up naked, asparagus-like suckers.

The decoction of the leaves of *Globularia alypum* acts as an active but gentle purgative, without griping, and has been recommended in preference to that of the leaves of senna. The natives of Morocco use them as a popular cathartic. *G. nudicaulis* has the same properties, but those of *G. vulgaris* are less feeble in their action.



ORDER CXLVIII.—ACANTHACEÆ.—BRANC-URSINES.

HERBS and shrubs. Leaves simple, opposite, or in whorls, and without leaflets at their base. *Flowers* hermaphrodite, irregular, arranged in spikes, with bracts at their base. *Calyx* with four or five regular or irregular segments, which are sometimes united. *Corolla* unequally five-partite, very frequently two-lipped, the superior one two-cleft, and the inferior three-lobed. *Stamens* two or four, when the latter, two are long and two are short. *Ovary* set on a hypogynous annular disk, free, two-celled, with two or a great number of amphitropal or campulitropal ovules. *Style* simple, terminated by a two-lobed stigma. *Fruit* a capsule, generally two-celled, but sometimes with one cell, opening with elasticity in two valves, each bearing a portion of the partition. *Seeds* generally supported on a hooked thread-like prolongment of the seed-bearers, which is sometimes dilated into the form of a cup. *Albumen* wanting; *embryo* curved or straight, with the radicle directed towards the hilum.



Fig. 177. A, Calyx and fruit of *Acanthus mollis*; B, fruit opened, shewing the seed with the prolongment; C, section of seed, with the radicle and seed-lobes.

SUB-ORDER I.—ANECHMATACANTHÆÆ.

Seeds not supported on a prolongment of the seed-bearer.

TRIBE 1. *Thunbergiææ*.—Prolongment of the seed-bearer dilated into the form of a horny cup, and adnate to the seed. Seeds thick, few. Fruit in some cases drupaceous.

GENERA AND SYNONYMES.

<i>Mendoncia</i> , Vell.	<i>Thunbergia</i> , L. f.	<i>Sehmidia</i> , Wight.	,, <i>Corythacanthus</i> , [Nees.]
<i>Mendozia</i> , R. & P.	<i>Meyenia</i> , Nees.	<i>Clistax</i> , Mart.	
<i>Engelia</i> , Karst.	<i>Hexacentris</i> , Nees.		

TRIBE 2. *Nelsoniææ*.—Prolongment of the seed-bearer contracted in the form of little nipple-like protruberances, bearing but not supporting the seeds. Seeds small, pitted.

GENERA AND SYNONYMES.

<i>Elytraria</i> , Vahl.	<i>Cardanthera</i> Ham.	,, <i>Stiftia</i> , Pohl.	<i>Erythracanthus</i> , [Nees.]
<i>Nelsonia</i> , R. Br.	<i>Ebermaiera</i> , Nees.		
<i>Adenosma</i> , Nees.			

SUB-ORDER II.—ECUMATACANTHÆ.

Seeds supported on a hooked prolongment of the seed-bearer.

TRIBE 3. *Hygrophileæ*.—Calyx five-cleft. Corolla gaping. Stamens either four, of which two are long and two short, or two, with the other two rudimentary. Anthers two-celled; cells parallel, either divergent, naked or spurred. Capsule narrow, many-seeded at the base, few-seeded in the middle.

GENERA AND SYNONYME.

* *Capsule bearing the seeds at the base.*

Hemiadelphis, <i>Nees</i> .	Nomaphila, <i>Bl.</i>	Cryptophragmium, <i>Nees</i>
Phyichilus, <i>Nees</i> .	Hygrophila, <i>R. Br.</i>	Belantheria, <i>Nees</i> .
Polychma, <i>Hochst.</i>	Eberlea, <i>Riddell</i> .	Leucorhaphis, <i>Nees</i> .
Glossochilus, <i>Nees</i> .	Gymnostachyum, <i>Nees</i> .	Petracanthus, <i>Nees</i> .

** *Capsule bearing the seeds in the middle.*

Sautiera, Decaisne.

TRIBE 4. *Ruellieæ*.—Calyx five-cleft. Limb of the corolla regular or slightly two-lipped, tubular, funnel-shaped, or somewhat bell-shaped, with a long tube. Stamens four, two long and two short, but sometimes only two by abortion. Cells of the anthers parallel, none of them spurred at the base. Capsule two, four, or many-seeded, and where it is few-seeded and sterile it is narrow and depressed at the base. Flowers axillary.

GENERA AND SYNONYMS.

Phlebophyllum, <i>Nees</i> .	Asystasia, <i>Bl.</i>	Stemonacanthus, <i>Nees</i> .
Codonacanthus, <i>Nees</i> .	Henfreyia, <i>Lindl.</i>	Paulo-Wilhelmia, <i>Hochst</i>
Asystasia, <i>Nees</i> .	Ramusia, <i>E. M.</i>	Episanthera, <i>Hochst.</i>
Endopogon, <i>Nees</i> .	Echinacanthus, <i>Nees</i> .	Eurychanes, <i>Nees</i> .
Stenosiphonium, <i>Nees</i> .	Stachyacanthus, <i>Nees</i> .	Arrhostoxylum, <i>Mrt.</i>
Dyschoriste, <i>Nees</i> .	Trianthus, <i>Nees</i> .	Scorodoxylum, <i>Nees</i> .
Calophanes, <i>Don</i> .	Leptacanthus, <i>Nees</i> .	Onychacanthus, <i>Nees</i> .
Homotropium, <i>Nees</i>	Echmanthera, <i>Nees</i> .	Tricanthera, <i>Kunth</i> .
Fabria, <i>Meyer</i> .	Goldfussia, <i>Nees</i> .	Macrostegia, <i>Nees</i> .
Petalidium, <i>Nees</i> .	Strobilanthes, <i>Bl.</i>	Sclerocalyx, <i>Nees</i> .
Dipteracanthus, <i>Nees</i> .	Martynia, <i>Moon</i> .	Gymnacanthus, <i>Nees</i> .
Neowedia, <i>Schrad.</i>	Buterea, <i>Nees</i> .	Ophthalmacanthus, <i>Nees</i>
Dizygandra, <i>Meisn.</i>	Adenacanthus, <i>Nees</i> .	Whitfieldia, <i>Hook.</i>
Hemigraphis, <i>Nees</i> .	Cryphiacanthus, <i>Nees</i> .	Aneylogyne, <i>Nees</i> .
Ruellia, <i>L.</i>	Siphonacanthus, <i>Nees</i> .	Pacilobenemis, <i>Mart.</i>
Crabbea, <i>Harv.</i>	Stephanophysum, <i>Nees</i> .	Androcentrum, <i>Lem.</i>

TRIBE 5. *Barlerieæ*.—Calyx either four-parted with unequal segments, or two-lipped. Corolla funnel-shaped or two-lipped, throat more or less inflated. Stamens four, two long and two short, two of which are sometimes rudimentary. Anthers two-celled, parallel. Capsule four-seeded at the base, rarely two-seeded. Flowers axillary.

GENERA AND SYNONYMS.

Barleria, <i>L.</i>	Lepidagathis, <i>W.</i>	Micranthus, <i>Wendl.</i>
Lophostachys, <i>Pohl</i> .	Russeggera, <i>End.</i>	Phayloopsis, <i>W.</i>
Asteracantha, <i>Nees</i> .	Apolepsis, <i>Hudsk.</i>	Teliostachya, <i>Nees</i> .
Neuracanthus, <i>Nees</i> .	Ætheilema, <i>R. Br.</i>	

TRIBE 6. *Acantheæ*.—Calyx four-parted, the lateral segments narrower; rarely five-parted, with the lateral segments somewhat narrower. Corolla one-lipped, with the tube cartilaginous at the base. Stamens four, two long and two short. Anthers one-celled (two celled in *Blepharis*), ciliated or bearded. Capsule four-seeded near the base. Flowers in spikes, bracteate.

GENERA AND SYNONYME.

<i>Blepharis</i> , <i>Juss.</i>	<i>Cheilopsis</i> , <i>Mag.</i>	<i>Acanthopsis</i> , <i>Harv.</i>
<i>Dilivaria</i> , <i>Juss.</i>	<i>Acanthodium</i> , <i>Del.</i>	<i>Isacanthus</i> , <i>Nees.</i>
<i>Acanthus</i> , <i>L.</i>	<i>Blepharacanthus</i> , <i>Nees</i>	<i>Sclerochiton</i> , <i>Harv.</i>

TRIBE 7. *Aphelandrææ*.—Calyx five-cleft, with the lobes of equal length, the two lateral ones rather narrower. Corolla two-lipped or gaping, in a few it is almost regular and funnel-shaped. Stamens four, nearly equal. Anthers one-celled, narrow. Capsule four-seeded at the base or in the middle; in a few it is two or six-seeded in the middle. Flowers in spikes, bracteate.

GENERA AND SYNONYMES.

<i>Crossandra</i> , <i>Sal.</i>	<i>Polythrix</i> , <i>Nees.</i>	<i>Geissomeria</i> , <i>Indl.</i>	<i>Aphelandra</i> , <i>R. Br.</i>
<i>Harrachia</i> , <i>Jacq.</i>	<i>Pœciloenemis</i> ,	<i>Salpicantha</i> , <i>Hook.</i>	<i>Synandra</i> , <i>Schrd.</i>
<i>Stenandrium</i> , <i>Nees.</i>	[<i>Mart.</i>	<i>Lagochilum</i> , <i>Nees.</i>	<i>Hemitome</i> , <i>Nees.</i>
<i>Caldenbachia</i> ,	<i>Holtzendorffia</i> , <i>Krst</i>	<i>Strobilorrhachis</i> , <i>Link.</i>	<i>Hemisandra</i> , <i>Sheido</i>
[<i>Pohl.</i>			

TRIBE 8. *Gendarusseæ*.—Calyx generally deeply four or five-cleft and regular. Corolla two-lipped or gaping. Stamens, in a few, four, two long and two short, but generally two with the rudiments of the sterile ones. Anthers one-celled or two-celled, or, where the four stamens are present, in the shorter stamens they are one-celled. The cells of the two-celled anthers are variously situated, some are parallel, others divergent at the base, others oblique on an oblique connective, naked or spurred. Capsule four-seeded, rarely many-seeded, mostly depressed and empty at the base, from which, almost to the middle, it is either depressed or compressed, and two-celled. Flowers either axillary somewhat whorled, or terminal, spicate or thyrsoid.

GENERA AND SYNONYMES.

* *Anthers one-celled.*

<i>Spirostigma</i> , <i>Nees.</i>	<i>Monotheccium</i> , <i>Hochst.</i>	<i>Holographis</i> , <i>Nees.</i>
<i>Mackenzia</i> , <i>Nees.</i>	<i>Stenostephanus</i> , <i>Nees.</i>	<i>Sebastiano-Schaueria</i> ,
<i>Haplanthera</i> , <i>Hochst.</i>	<i>Galeottea</i> , <i>Nees.</i>	[<i>Nees.</i>
<i>Ruttya</i> , <i>Harv.</i>	<i>Anthocometes</i> , <i>Nees.</i>	<i>Chætothylax</i> , <i>Nees.</i>
<i>Ramusia</i> , <i>Nees.</i>	<i>Labracanthus</i> , <i>Nees.</i>	

** *Anthers two-celled, naked.*

<i>Heinzelia</i> , <i>Nees.</i>	<i>Graptophyllum</i> , <i>Nees.</i>	<i>Plagiacanthus</i> , <i>Nees</i>
<i>Schaueria</i> , <i>Nees.</i>	<i>Cyrtanthera</i> , <i>Nees.</i>	<i>Rhytiglossa</i> , <i>Nees.</i>
<i>Pachystachys</i> , <i>Nees.</i>	<i>Hooverdenia</i> , <i>Nees.</i>	<i>Amphisopia</i> , <i>Nees.</i>
<i>Phlogacanthus</i> , <i>Nees.</i>	<i>Cardiacanthus</i> , <i>Nees.</i>	<i>Orthotactus</i> , <i>Nees.</i>
<i>Loxanthus</i> , <i>Nees.</i>	<i>Jacobinia</i> , <i>Nees.</i>	<i>Sericographis</i> , <i>Nees.</i>
<i>Duvernoia</i> , <i>E. M.</i>	<i>Harpochilus</i> , <i>Nees.</i>	<i>Herpetacanthus</i> , <i>Nees.</i>
<i>Thysacanthus</i> , <i>Nees.</i>	<i>Drejera</i> , <i>Nees.</i>	<i>Schultzia</i> , <i>Nees.</i>
<i>Odontonema</i> , <i>Nees.</i>		

* * *Anthers two-celled, horned or spurred at the base.*

Hemichoriste, <i>Nees.</i>	Schwabea, <i>Endl.</i>	Amblyanthus, <i>Nees.</i>
Anisostachya, <i>Nees.</i>	Pogonospermum,	Gendarussa, <i>Rumph.</i>
Rostellaria, <i>Rehb.</i>	[<i>Hochst.</i>	Monechma, <i>Hochst.</i>
Rostellaria, <i>Nees.</i>	Adhatoda, <i>Nees.</i>	Simonisia, <i>Nees.</i>
Leptostachya, <i>Nees.</i>	Tyloglossa, <i>Hochst.</i>	Beloperone, <i>Nees.</i>
Campylostemon, <i>E.M.</i>	Athlianthus, <i>Endl.</i>	Anisotes, <i>Nees.</i>
Sarotheca, <i>Nees.</i>		

TRIBE 9. *Eranthemææ*.—Calyx five-parted. Corolla wine-glass-shaped or short funnel-shaped, with an elongated tube; limb regular or nearly so, five-cleft or two-lipped, with the upper lip narrow. Perfect stamens mostly two, inserted below the throat; in a few there are four, two long and two short. Anthers two-celled; cells parallel, naked, rarely placed the one above the other. Capsule distinctly clawed, two to four seeded at the middle. Flowers in spikes or heads.

GENERA.

Justicia, <i>L.</i>	Anisacanthus, <i>Nees.</i>	Chameranthemum,	Anthacanthus, <i>Nees</i>
Rhinacanthus, <i>Nees</i>	Eranthemum, <i>L.</i>	[<i>Nees.</i>	Chaetacanthus, <i>Nees</i>
Sericospora, <i>Nees.</i>	Lankesteria, <i>Lindl.</i>		

TRIBE 10. *Diclipterææ*.—Calyx deeply five-parted, regular. Corolla either two-lipped with the lips almost conformable, or funnel-shaped with the limb regular. Stamens generally two, in a few cases four, two long and two short; anthers either one-celled or two-celled, the cells either parallel or placed one above the other, the inferior of which is either naked or rarely spurred. Capsule two to four-seeded in the middle; in some the partition (dissepiment) separates from the valves, and rises up elastically when ripe. Flowers either in spikes or heads.

GENERA AND SYNONYMS.

* *Dissepiment separating.*

Pentstemonacanth-	Alvarezia, <i>Pav.</i>	Rungia, <i>Nees.</i>	Dianthera, <i>Sol.</i>
[us, <i>Nees.</i>	Tetramerium, <i>Nees.</i>	Dicliptera, <i>Juss.</i>	Henrya, <i>Nees.</i>
Blechnum, <i>P. Br.</i>			

** *Dissepiment permanent; anthers two-celled.*

Brochosiphon, <i>Nees.</i>	Peristrophe, <i>Nees.</i>	Raphidospora, <i>Nees.</i>
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* * *Dissepiment permanent; anthers one-celled.*

Hypoestes, <i>R. Br.</i>	Lasiocladus, <i>Boj.</i>	Brachystephanus, <i>N</i>	Clinacanthus, <i>Nees</i>
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TRIBE 11. *Andrographideææ*.—Calyx five-cleft, equal. Corolla two-lipped, superior lip two-toothed, the inferior three-cleft, often resupinate. Stamens two, extending beyond the tube of the corolla; anthers either one-celled by abortion, or, if two-celled, the inferior one is more or less bearded or woolly. Capsule six or eight-seeded at the base. Flowers axillary, solitary, or racemose.

OENERA.

Haplanthus, Nees.

| Erianthera, Wall.

| Andrographis, Wall.

GEOGRAPHICAL DISTRIBUTION.—These are mostly all natives of the tropics of both hemispheres, beyond which they are rare; and the only genus known to inhabit temperate regions is the *Acanthus*.

PROPERTIES AND USES.—The great part of this family is mucilagenous, with in some a mixture of a bitter substance; in others acidity prevails; a few possess stimulating virtues dependent on the presence of an essential oil; and some yield a blue and red colouring matter. The leaves of *Dipteracanthus strepens*, mixed with castor oil, are employed in India as an application to eruptions during teething in children. The roots of *D. bahiensis* are said to be emetic, and are used in South America under the name of "coccis" and "false ipecacuanha." The same use is made of those of *Cryphiacanthus barbadensis*. The juice of the leaves of *Adenosma uliginosa*, mixed with salt, is used on the coast of Malabar as a purifier, and *A. balsamea* has a strong odour of turpentine. There is a species of *Ruellia* yields a deep blue dye, which in Assam is called *room*. *Acanthus mollis*, or *Bear's Breach*, is more remarkable for the beauty of its forms and the elegance of its leaves than for any properties it possesses. It is said that it was this plant which, by the graceful elegance of its leaves, suggested to the ancient Greeks the ornament for the capital of the Corinthian pillar. The leaves and roots of this species and those of *A. spinosus* are considered emollient, and have been used in cataplasms and fomentations. The inhabitants of Trebisonde regard this plant as a remedy for all ailments, and particularly as an infallible vulnerary. Forskahl says that in Arabia the leaves of *Acanthodium spicatum* are eaten raw, and that they are savoury and agreeable. Rheede says that the leaves of *Dilivaria ilicifolia* and its young shoots, bruised in water, are efficacious against the bites of venomous serpents. *Rhytiglossa pectoralis*, boiled in sugar, yields a sweet-scented syrup, which in Jamaica is considered a stomachic. All the parts of *Adhatoda vasica* are bitterish and slightly aromatic, and supposed to be antispasmodic; the wood is soft, and much esteemed for making charcoal for gunpowder. The leaves and stalks of *Gendarussa vulgaris*, when rubbed, have a strong, rather aromatic odour. After being roasted, they are given in chronic rheumatism by the native practitioners of India. The plant is also said to be emetic. *Andrographis paniculata*, or *Creat*, a native of India, is celebrated as a stomachic bitter, and is used in cholera and dysentery. It is the basis of the celebrated *Droque amère*, which is a compound of mastick, frankincense, resin, myrrh, aloes and creat root, steeped in brandy for a month, and the tincture strained and bottled. Milk boiled with the roots of *Rhinacanthus communis* is considered aphrodisiac in India, and with lime juice and pepper it is used for the cure of ringworm, also for the bites of venomous snakes: hence the Telinga and Tamul name, *Naga mulli*, or Jasmine of the cobra di capella.

ORDER CXLIX.—LENTIBULARIACEÆ—BUTTERWORTS.

THIS small family is distinguished from Primulaceæ by its irregular corolla, its two stamens, and its embryo without albumen. From Scrophulariaceæ by its one-celled fruit, with a free-central seed-bearer, and by its embryo without albumen.

GENERA AND SYNONYMES.

Utricularia, <i>L.</i>	Pinguicula, <i>T.</i>	Tetralobus, <i>A. DC.</i>
Lentibularia, <i>Gesn.</i>	Brandonia, <i>Reichb.</i>	Polypomphlox, <i>Lehm.</i>
Genlisea, <i>St. Hil.</i>		

GEOGRAPHICAL DISTRIBUTION.—These are found in all parts of the world, but particularly between the tropics. They inhabit marshy places.

PROPERTIES AND USES.—Linnæus states, that if the fresh gathered leaves of *Pinguicula vulgaris* are put into a filter or strainer, through which warm milk from the reindeer is poured, and the milk is set for a day or two to become acescent, it acquires consistence and tenacity; the whey and the cream do not separate; in this state it is an extremely grateful food, and as such is used by the inhabitants in the north of Sweden. There is no further occasion to have recourse to the leaves, for half a spoonful of this prepared milk, mixed with fresh warm milk, will have the same effect. It has been found that it does not act in the same manner on cows' milk. The juice of the leaves kills lice, and the common people in Sweden use it to cure cracks or chaps in cows' udders.



ORDER CL.—PRIMULACEÆ.—PRIMROSES.

ANNUAL or perennial herbs. *Leaves* radical, opposite, or in whorls, very rarely scattered. *Flowers* hermaphrodite, regular, either arranged in umbels on a flower-stalk proceeding directly from the root, or in axillary or terminal clusters. *Calyx* with five, rarely four to seven lobes. *Corolla* of one petal, with five, rarely four to seven lobes, sometimes tubular, and sometimes deeply divided into segments. *Stamens* equal in number to the lobes of the corolla and opposite to them; either free or united in one bundle, inserted in the top of the tube of the corolla, or at the base of its lobes; sometimes there is the trace of five normal stamens alternate with the lobes, reduced to the state of sterile filaments. *Ovary* free, one-celled, many-ovuled, with a free-central ovule-bearer. *Style* and *stigma* simple. *Fruit* a one-celled, many-seeded capsule, opening longitudinally in three or five valves, or circularly with a lid. *Seeds* numerous, with fleshy albumen, and the radicle lying across the hilum.

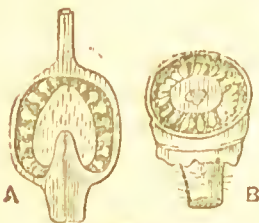


Fig. 178. Section of the flower of *Primula elatior*. A, Section of capsule of *Primula chinensis*; B, transverse ditto; C, capsule of *Anagallis arvensis* open; D, section of seed of ditto, with the embryo crossing the hilum.

TRIBE 1. *Hottoniæ*.—Capsule opening by valves. Seeds inverted with a basilar hilum. Embryo erect.

GENUS AND SYNONYME.

Hottonia, L.

Stratiotes, Vaill.

TRIBE 2. *Primulæ*.—Capsule opening by valves at the top. Seeds half inverted, with a neutral hilum. Embryo transverse.

GENERA AND SYNONYMES.

Primula, L.
Oscaria, Lilja.
Dionysia, Fenzl.
Gregoria, Duby.
Aretia, Gaud.
Vitaliana, Sessl.
Douglasia, Lindl.
Androsace, T.
Cortusa, L.
Dodecatheon, L.
Meadia, Catesb.
Cyclamen, L.
Soldanella, L.
Coris, L.
Glaux, L.
Trientalis, L.

Coxia, Endl.
Lubinia, L. & O.
Lubinia, Vent.
Nanmburgia, Mön.
Thyrsanthus, Schrank.
Lysimaehia, L.
Palladia, Mön.
Godinella, Lestib.
Ephemerum, Rchb.
Apoehoris, Duby.
Steironema, Raf.
Anagranthe, Baudo.
Pelletiera, St. Hil.
Asterolinum, H. & L.
Euparea, Gärt.

TRIBE 3. *Anagallidæ*.—Capsule opening transversely. Seeds half inverted, with a neutral hilum. Embryo transverse.

GENERA.

Anagallis, T.

| *Micropyxis*, Duby.

| *Centunculus*, L.

TRIBE 4. *Samoleæ*.—Capsule opening by valves at the top. Seeds inverted, with a basilar hilum. Embryo transverse.

GENERA AND SYNONYME.

<i>Samolus</i> , L.		<i>Samodia</i> , <i>Barido</i> .
<i>Sheffieldia</i> , <i>Forst</i> .		

GENERA NOT SUFFICIENTLY KNOWN.

<i>Mankia</i> , <i>Bowd</i> .		<i>Findlaya</i> , <i>Bowd</i>
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GEOGRAPHICAL DISTRIBUTION.—These are mostly found in the temperate regions of the northern hemisphere, particularly in the mountainous parts of Europe and Asia. They are rare between the tropics.

PROPERTIES AND USES.—The whole family are distinguished by the beauty of their flowers. The roots of many abound in a volatile, acrid substance; others contain a bitter extractive, and resinous matter; the herbaceous parts of some are astringent, and the flowers of many of them are sweet, and yield a volatile oil.

The leaves and root of the *Common Primrose* (*Primula vulgaris*), dried and reduced to powder, cause sneezing when snuffed up the nostrils; and the root itself acts as an emetic. The fresh roots of the *Cowslip*, or *Paigle* (*P. veris*), smell like anise and garlic, and are also sternutatory when dried and reduced to powder. They contain a bitter substance similar to senega, a little arthanasin, a yellowish, somewhat concrete, essential oil with the odour of fennel, malate and phosphate of chalk, pectic acid, and a matter soluble in alcohol. They are a popular remedy as a nervine tonic, and applied as a relief for pains in the joints. In some countries the leaves are used as a salad and pot-herb; and they also serve as food for the silkworm before those of the mulberry have expanded. The flowers are fragrant, and make a pleasant wine, which has the flavour of muscadell, and is said to be sedative, diaphoretic, and soporific; they have also a rough, bitterish taste, with a fine fragrance, which they communicate to water and alcohol; mixed with honey, an agreeable drink is prepared with them in Sweden, and in spring, large quantities of the flowers are dried and kept for future use. Vinous liquors impregnated with them, by tincture or maceration, and infusions of them drunk as tea, are supposed to be mildly corroborant, antispasmodic, and anodyne. Boerhaave and Linnæus both assert that they soothe pain and procure sleep. At Samara, in Russia, the young scapes, or flower-stalks are eaten as an antispasmodic. The leaves of the *Auricula* (*P. auricula*) are used in the Alps as a remedy for coughs. All the Primroses are attractive as garden-flowers under whatever name they are known, whether as *Polyanthus*, a variety of *P. veris*, *Orlip* (*P. elatior*), or the many varieties of the common Primrose. The *Chinese Primrose* (*P. sinensis*) is one of the greatest ornaments of our rooms and greenhouses during the winter and spring months.

Cyclamen europæum, or *Sowbread*, is found in some parts of Britain, but it grows abundantly in the South of Europe, in elevated situations, and particularly in Sicily, where the swine eat the root-stalks with great relish. It forms a large, round, flat tuber, or root-stalk, which sometimes acquires a very large size; we have seen them upwards of nine inches in diameter, but they are doubtless to be found even larger. It is from the

centre of the root-stalk that the leaves and flowers proceed, as the plant has no other stem. In a fresh state, the root-stalk is acrid, burning, and bitter; but when dried, its activity is diminished, and when roasted it becomes perfectly harmless, and may be eaten like any other farinaceous food. It acts as a violent drastic, purgative, and emetic, and is capable of causing abortion. In the South of Europe the peasantry sometimes use it as a purgative, but with serious results, accompanied with inflammation of the stomach and bowels, cold perspirations, vertigo, convulsions, and even death. It is singular that, while pigs can eat any quantity of the tubers with impunity, the juice acts as a poison on small fish, if mixed with the water in which they are, in the proportion of 1 to 3000. M. de Luca found that four grains of the juice, injected into the trachæa of a rabbit, caused it to die in convulsions in the course of ten minutes. There is an ointment prepared from it, under the name of *Onguent d'Arthanita*, which, when applied by friction to the navel in children, expels intestinal worms; rubbed on the stomach, it acts as an emetic, and, if applied to the region of the bladder, it causes an increase of urine; it also cures carache. The active properties of the plant have recently been discovered, by M. de Luca, to reside in a principle which he calls *Cyclamine*, a powerful poison, producing effects similar to those of Woorari, which the Indians of Rio Negro poison their arrows with. It is white, opaque, and brittle, emits no particular smell, absorbs humidity from the atmosphere, becomes transparent and gelatinous in water, and assumes a dark colour, when exposed to the action of light. Bromine appears to be an antidote to this poison, or at least to mitigate its effects, and it has the same power over the woorari poison. In Greece the bruised root of *C. persicum* is used for driving the sepia octopodia out of their holes.

The *Soldanellas* are slightly purgative. The root of *Coris monspeliensis*, a heath-like plant, growing in Spain and the South of Europe, is emetic, and the whole plant is used by the Arabs as an antisyphilitic. In Valencia, where it is called *Simfita petreo*, it is reduced to powder, and highly esteemed for healing wounds, which it does in a few days by being spread over them at each dressing. *Trientalis europæa* has the reputation of being vulnerary and astringent; its root is emetic. The *Lysimachias* are bitter and astringent. *Anagallis arvensis* is a plentiful weed in cornfields, and is known by the names *Scarlet Pimpernel*, *Poor Man's Weather-glass*, and *Shepherd's Barometer*; the two last are suggested by the flowers always closing before rain; but, should the weather be ever so bright, they always shut up at noon. The plant had the reputation of curing hydrophobia, but no such property now attaches to it. Orfila killed a dog with three drachms of the extract, and found the membrane of the stomach highly inflamed. Nothing certain is known of the properties of the plant, and under any circumstances it should be used with great caution; sheep will not eat it, and its seeds destroy birds. *Samolus valerandi*, or *Water Pimpernel*, is bitter, aperient, antiscorbutic, and vulnerary. This is supposed to be the plant which Pliny calls *Samolus*, and which, he says, the Druids gathered fasting, with the left hand, and without looking at it. It was then carried, without being laid on the ground, to places where cattle drink, and there put in the water and bruised, its virtues not only curing diseased cattle, but preserving others from disease.

ORDER CLI.—PLUMBAGINACEÆ.—LEADWORTS.

HERBS, or shrubs.

Leaves alternate, sometimes united at the base, and sheathing the stem; the radicle ones proceed from the summit of a root-stock (rhizome). *Flowers* hermaphrodite, regular, arranged in spikes, or in terminal bunches. *Calyx* persistent, tubular, plaited, five-toothed. *Corolla* one-petalled, four-parted, or with five distinct petals, clawed. *Stamens* five, opposite the lobes or the petals, inserted on the petals, when the corolla is many-petalled, and hypogynous when it is one-petalled. *Ovary* free, one-celled, one-ovuled, the ovule suspended from the summit of an umbilical cord. *Styles* five, rarely three or four, sometimes united. *Fruit* membranaceous, one-seeded, enclosed in the calyx. *Seed* inverted, with a mealy albumen, and a straight embryo, with a superior radicle.

TRIBE 1. *Staticeæ*.—Calyx thin, dry, and membranous. Corolla five-petalled, clawed, and bearing the stamens. Styles distinct.

GENERA AND SYNONYMES.

Ægialitis, R. Br.
Ægialinitis, Presl.
Acantholimon, Boiss.
Goniolimon, Boiss.
Statice, L.
Limonium, T.

Eurychiton, Nimmo.
Taxanthema, Neck.
Armeria, W.
Statice, T.
Limoniastrum, Mön.

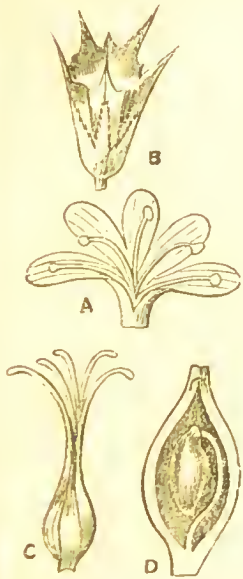


Fig. 179. A, Corolla of *Armeria vulgaris*; B, calyx; C, pistil and styles; D, section of ovary, with the ovule.

TRIBE 2. *Plumbagææ*.—Calyx herbaceous, or nearly so. Corolla one-petalled. Stamens hypogynous. Styles united. Stigmas distinct.

GENERA AND SYNONYMES.

Plumbagella, Spach	Thela, Lour.	„ Ceratostigma,	Vogelia, Lam.
Plumbago, T.	Valoradia, Hochst.	[Bunge.]	Bubania, Girard.

GEOGRAPHICAL DISTRIBUTION.—The *Staticeæ* grow most abundantly on the sea shores of the temperate regions of both hemispheres. They are plentiful in Russian Asia, and are rare in Australia. Some are found in mountainous parts, extending from the arctic to the antarctic zones. The *Plumbagææ* are generally tropical or subtropical, only one species being found in Europe.

PROPERTIES AND USES.—The root of *Statice caroliniana*, called in the United States *Marsh Rosemary*, is bitter, and extremely astringent, and may be used for all purposes for which Kino and Catechu are given, but it is most frequently used as a domestic remedy for aphthous and ulceratious affections of the mouth. It has been found to contain tannic acid, gum,

extractive, albumen, volatile oil, resin, caoutchoue, colouring matter, lignin, and various salts, among which were common salt, and sulphates of soda and magnesia. The proportion of tannic acid was 12·4 per cent. *S. limonium*, or *Sea Lavender*, is frequent on the muddy shores of England, and its root has been known as an astringent from the time of Pliny. It has been recommended as a gargle for ulcerated sore throat, in ulcers of the mouth, and dysentery. *S. speciosa* is the popular remedy for relaxation of the uterus, among the inhabitants on the banks of the Irkutsk, and the Lake of Baikal. In Siberia they tan skins with the root of *S. trigona*, and, in the Caucasus, the same use is made of the root of *S. latifolia*. Several of the species bear galls, like many other plants that contain tannin. *Armeria vulgaris* (*Common Thrift*, or *Sea Gilliflower*) is a pretty plant, often grown in gardens to form borders to walks. A decoction of its flowers is considered diuretic in Germany, and its use is often attended with success. *Plumbago europæa*, or *Leadwort*, is acrid in all its parts, and particularly in the root, which, when chewed, excites a flow of saliva, and has long been used to cure toothache. A decoction of the root in olive oil, has been found very successful in curing the itch, healing old ulcers, and, it is even asserted, true cancer also. It is a powerful rubefacient and vesicatory, and a young woman who was rubbed with it, stated to Sauvago-Delacroix that she had the feeling as if she was being flayed alive; taken internally it acts as an emetic, like ipecacuanha. The root of *P. rosea* is a powerful vesicatory, and is employed as such in Java; it causes more inflammation than cantharides, but produces less serosity. *P. scandens*, and *P. zeylanica*, have the same properties. These plants contain a peculiar principle, called *Plumbagine*, on which their active properties depend. It is acrid, volatile, non-alkaline; in the form of small, angular, orange-coloured crystals of an acrid, burning taste, slightly soluble in water, and in alcohol, and gives a red colour with the alkalis.



ORDER CLII.—PLANTAGINACEÆ—RIBWORTS.

HERBS, rarely shrubs. *Leaves* alternate, or opposite, entire, or pinnatifid, often proceeding immediately from the root, where they form a rosette on the surface of the ground. *Flowers* regular, generally hermaphrodite, but unisexual in *Litorella*, arranged in spikes, and rarely solitary. *Calyx* with four deep divisions, persistent. *Corolla* tubular, rarely entire in the limb, thin, dry, and membranous. *Stamens* four, inserted in the corolla, and alternating with its segments; in *Litorella* they are inserted in the receptacle. *Ovary* free, with one, two, or very rarely four cells, containing one or many ovules. *Style* simple, capillary, terminated by a simple, awl-shaped, rarely two-cleft stigma. *Fruit* a capsule, opening circularly with a lid, and covered with the persistent corolla. *Seeds* with fleshy albumen; *embryo* lying across the hilum, with an inferior, and sometimes centrifugal radicle, remote from the hilum.



Fig. 180. A, Flower of *Plantago lanceolata*; B, pistil; C, capsule; D, section of seed, showing the embryo.

GENERA AND SYNONYMS.

Litorella, L.
Bougeria, Decaisne.
Plantago, L.

„ *Psyllium*, L.
 „ *Coronopus*, T.
Arnoglossum, Endl.

GEOGRAPHICAL DISTRIBUTION.—They are found in all parts of the habitable world, but are most plentiful in temperate regions.

PROPERTIES AND USES.—The leaves are bitter and astringent, and are regarded as vulnerary in popular practice. Those of *Greater Plantain*, or *Waybread* (*Plantago major*), are recommended as an external application to ulcers, and indolent scrofulous tumours. The root is said to have proved useful in intermittents, but the action of the whole plant is very feeble. Small birds are very fond of its seeds, and the spikes are frequently gathered in autumn and winter, and stuck between the wires of their cages. *Ribgrass*, or *Ribwort* (*P. lanceolata*), is much cultivated as a food for sheep, and as a mixture in artificial grasses, for laying down permanent pasture. The seeds of *P. psyllium*, or *Fleawort*, are called *Fleascseed*. They contain a great quantity of mucilage, which causes them to be extensively used by muslin manufacturers for stiffening their goods; they are also employed by paper-stainers and bookbinders. They form rich, mucilaginous drinks, in catarrh, and other diseases for which linseed is used. Those of *P. arenaria* are used for the same purpose.

CLASS IV.—PERIANTHIFLORÆ or ACOROLLIFLORÆ.

FLOWERS monoehlamydeous, that is, provided with only one floral envelope, called a perianth, which is sometimes altogether wanting; when present it is either green or coloured, and may be considered a calyx when the stamens are opposite its lobes, and a corolla when they are alternate with them. The ovules are either contained in an ovary and fertilised by the action of the pollen on the stigma, or they are naked, and fertilised by the direct action of the pollen without the intervention of a stigma.



Group 1. ANGIOSPERMÆ. — Seeds inclosed in a capsule.

§ 1. *Hypogynæ*. — Flowers hermaphrodite, sometimes unisexual by abortion. Stamens inserted in the receptacle, under the ovary. Ovary superior.

- Order 153. NYCTAGINACEÆ.
 154. PHYTOLACCACEÆ.
 155. AMARANTACEÆ.
 156. SALSOLACEÆ.
 157. POLYGONACEÆ.

§ 2. *Perigynæ*. — Flowers hermaphrodite, sometimes unisexual by abortion. Stamens inserted in the perianth. Ovary inferior.

- Order 158. CEPHALOTACEÆ.
 159. TETRAGONIACEÆ.
 160. BASELLACEÆ.
 161. SCLERANTHIACEÆ.
 162. LAURACEÆ.
 163. PROTEACEÆ.
 164. PENÆACEÆ.
 165. THYMELACEÆ.
 166. ELÆAGNACEÆ.
 167. HERNANDIACEÆ.
 168. ULMACEÆ.
 169. SAMYDACEÆ.

§ 3. *Epigynæ*. — Flowers hermaphrodite, sometimes unisexual. Stamens inserted in the perianth, which is adherent. Ovary inferior.

- Order 170. TERMINALIACEÆ.
 171. NYSSACEÆ.
 172. GRUBBIACEÆ.
 173. HELWINGIACEÆ.
 174. SANTALACEÆ.

Order 175. VISCACEÆ.

176. ARISTOLOCHIACEÆ.

§ 4. *Dictynæ*. — Flowers unisexual and often destitute of a perianth.

Order 177. NEPENTHACEÆ.

178. BEGONIACEÆ.
 179. DATISCEÆ.
 180. EMPETRACEÆ.
 181. CALLITRICHACEÆ.
 182. CERATOPHYLLACEÆ.
 183. EUPHORBACEÆ.
 184. MYRISTICACEÆ.
 185. CALYCANTHACEÆ.
 186. MONIMIACEÆ.
 187. URTICACEÆ.
 188. PLATANACEÆ.
 189. SCEPACEÆ.
 190. STILAGINACEÆ.
 191. LACISTEMACEÆ.
 192. PODOSTEMONACEÆ.
 193. CHLORANTHACEÆ.
 193* SAURURACEÆ.
 194. PIPERACEÆ.
 195. GARRYACEÆ.
 196. JUGLANDACEÆ.
 197. CUPULIFERÆ.
 198. BETULACEÆ.
 199. BALSAMIFLUEÆ.
 200. SALICACEÆ.
 201. MYRICACEÆ.
 202. CASUARINACEÆ.

Group 2. GYMNOSPERMÆ. — Seeds naked. Embryo with many seed-lobes.

- Order 203. GNETACEÆ.
 204. TAXACEÆ.
 205. CONIFERÆ.
 206. CYCADACEÆ.

ORDER CLIII.—NYCTAGINACEÆ.—MARVELS OF PERU.

HERBS, shrubs, or trees. *Leaves* simple, opposite, sometimes alternate, without leaflets at their base. *Flowers* axillary or terminal, often collected in a common involucre, or each having a proper involucre; hermaphrodite, rarely unisexual. *Perianth* tubular, coloured, having the appearance of a true corolla in some species. *Stamens* inserted in the receptacle, equal in number to the lobes of the perianth, and opposite them. *Ovary* free, one-celled, and containing one erect ovule. *Style* terminal, simple; *stigma* capitate. *Fruit* a dry, single, seed-nut, partly covered by the disk and the base of the perianth, which become hard. *Seeds* composed of a homotrope embryo with leafy seed-lobes, curving round a mealy albumen; radicle inferior.

TRIBE 1. *Mirabilæ*.—Involucre in the form of a calyx, and either in one or in several leaves.

GENERA AND SYNONYMES.

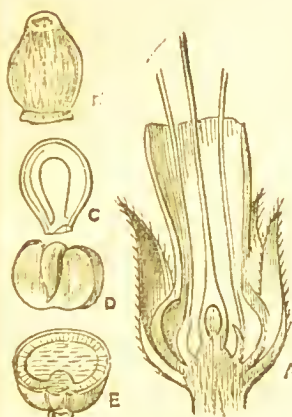


Fig. 181. A, Section of the base of the flower of *Mirabilis Jalapa*; B, the seed; C, vertical section of ditto; D, embryo; E, transverse ditto; D, embryo.

Mirabilis, L.
Jalapa, T.
Nyctago, Juss.

Quamoelidion, Choisy.
Nyctaginia, Choisy.
Oxybaphus, Vahl.
Calyxhymenia, Ort.
Calymenia, Fers.
Vitmannia, Cav.
Palavia, Cav.

Bruquieria, Cav.
Allionia, Löffl.
Allionia, Choisy.
Wedelia, Löffl.
Abronia, Juss.
Trieratus, Herit.

TRIBE 2. *Bougainvilleæ*.—Involucre in the form of a bract.

GENERA AND SYNONYMES.

Tricelya, Cav.
Bougainvillea, Choisy

„ *Buginvillea*, Comm.
Josepha, Vell.

TRIBE 3. *Boerhaavieæ*.—Involucre wanting. Bracteoles one to three, sometimes deciduous, sometimes persistent.

GENERA AND SYNONYMES.

Boldoa, Cav.
Salpianthus, H & B
Reichenbachia, Sz.
Colignonia, Endl.
Pisonia, Pl.
Calpidia, Thouars
Pallavia, Vell.

Torrubia, Vell.
Bessera, Vell.
Columella, Vell.
Tragularia, Kun.
Neca, R. & P.
Nebra, Nor.


Mitserherliehia,
[Knth.]
Okenia, Sch. & Ch.
Boerhaavia, L.
Antaniosophyllum
[Vaill.]
Dantia, Lipp.

Tinantia, Mart.
Lindenia, Mart.
Senkenbergia,
[Schauer].
Leuceaster, Choisy.
Epilithes, Bl.

GEOGRAPHICAL DISTRIBUTION.—A few species of *Abronia* are found in the north-west of America, and a few *Boerhaavias* in Australia and in

south America, beyond the tropics; but the greater part of the family are natives of the tropics in both hemispheres.

PROPERTIES AND USES.—The roots of *Marvel of Peru* (*Mirabilis Jalapa*) were long considered to furnish the true officinal Jalap, and were therefore regarded as a purgative; but it has been proved that this virtue exists in a very slight degree. They have an acrid and nauseous taste, and abound in starch. The seeds, also, are composed of a great quantity of farina, and on that account have been proposed as an article of diet; and with this flour the Japanese ladies make a white paint for their cheeks. The flowers are very beautiful, and do not open in hot weather till the evening; but if it is cool, or the sun is obscured, they open in the daytime. *M. dichotoma* and *M. longiflora* are much more purgative than the preceding. The former is called *Four-o'clock-flower*, from opening at that hour of the day. *M. suaviolens* is employed in Mexico against diarrhœa and rheumatic pains. *Pisonia fragrans* is regarded as an active emetic in Cuba. The juice of the leaves of *Boerhaavia hirsuta* is employed against jaundice and induration of the liver in Brazil, where it is called *Erva tuastao*. *B. diffusa* is said by Jacquin to be used in America as a potherb, and the root is regarded as a purgative among the native Indian practitioners. *B. paniculata* has roots that are emetic and purgative, and are called ipeacuanha in Guiana, and in Java they are used instead of the root of that plant. It is called *Hog's-meat* in Jamaica, and Schomburgk states that it is astringent, and is used in the state of decoction in dysentery. *B. tuberosa* is employed as a purgative in Chili and Peru, although it is stated that the natives eat the roots, which may possibly be the case after they have been cooked, and thereby lost their purgative qualities. The Peruvian goldsmiths use a decoction of *Colignonia parviflora* for cleansing silver vessels.



ORDER CLIV.—PHYTOLACCACEÆ.—POKEWEEDS.

HERBS and sometimes shrubs. *Leaves* simple, alternate, very rarely opposite, with or without leaflets at the base. *Flowers* in racemes, hermaphrodite, regular. *Perianth* with four or five divisions, which are sometimes coloured like petals. *Stamens* variable in number, but when equal to that of the divisions of the perianth, then they are alternate with them; they are inserted in the disk that lines the base of the perianth. *Ovary* composed of one or several one-celled carpels, arranged in a whorl, more or less united, and each containing an ascending ovule. *Styles* and *stigmas* equal in number to the carpels. *Fruit* fleshy or dry, with one or many cells, unopening. *Seeds* ascending, solitary, with a cylindrical embryo curved round a flowery albumen, and the radicle next the hilum; but in *Seguieria* the albumen is wanting, and in *Petiveria* the embryo is straight.

SUB-CLASS I.—PETIVERIÆ.

Fruit simple, consisting of one carpel. Seed-lobes convolute.

TRIBE 1. *Seguieriæ*.—Fruit a seed-nut (achene); albumen wanting or spare. Embryo straight or curved.

GENERA.

Seguieria Lüffl. | *Gallesia*, Casar. | *Petiveria*, Pl.

TRIBE 2. *Riviniæ*.—Fruit a berry, becoming ultimately dry, or a leathery seed-nut. Albumen copious. Embryo annular.

GENERA AND SYNONYMES.

Rivina, Pl.
Piercea, Mill.
Rivinia, L.

Solanoides, T.
Ledenbergia, Klotz.

Mohlana, Mart.
Illieria, Fl. Fl.
Mancoa, Raf.

SUB-CLASS II.—PHYTOLACCÆ.

Fruit rarely simple, generally composed of two or many carpels; carpels distinct or united, without a central column. Seed-lobes not at all convolute.

TRIBE 1. *Microteæ*.—Fruit simple, with a crustaceous covering.

GENUS AND SYNONYMES.

Microtea, Swartz.
Schollera, Rohr.

| „ *Ancistrocarpus*, H. B. K. | „ *Ceratococca*, W.
| *Potamophila*, Schrank. | *Aphananthe*, Link.



Fig. 182. A, Spike of *Phylolacca decandra*; B, flower; C, fruit; D, section of seed.

TRIBE 2. *Limææ*.—Fruit double, rarely polycarpous; carpels nut-like, with a membranous covering.

GENERA AND SYNONYMES.

<i>Semonvillea</i> , <i>Gay</i> .	<i>Limcum</i> , <i>L.</i>	<i>Gaudinia</i> , <i>Gay</i> .
<i>Ditroche</i> , <i>E. Mey.</i>	<i>Linseotia</i> , <i>Ad.</i>	<i>Anisomeria</i> , <i>Don</i> .

TRIBE 3. *Giesekieæ*.—Fruit polycarpous. Carpels either fleshy, dry, or with an inflated covering; seed-covering testaceous.

GENERA AND SYNONYMES.

<i>Giesekia</i> , <i>L.</i>	<i>Pireunia</i> , <i>Moq.</i>	<i>Ercilia</i> , <i>Endl.</i>
<i>Kölreuteria</i> <i>Murr</i>	<i>Ercilla</i> , <i>Juss.</i>	<i>Phytolacca</i> , <i>T.</i>
<i>Miltus</i> , <i>Lour.</i>	<i>Bridgesia</i> , <i>Hook & Arn.</i>	<i>Sarcoea</i> , <i>Raf.</i>

SUB-CLASS III.—GYROMERIEÆ.

Fruit composite, generally two or many-celled, with the carpels united to a central tube, and the partitions rarely abortive. Seed-lobes linear, not at all convolute. Leaves without stipules.

TRIBE 1. *Stegnospermeæ*.—Flowers hermaphrodite. Fruit one-celled, and the seeds attached to a central column.

GENUS.

Stegnosperma, *Bentham*.

TRIBE 2. *Gyromerieæ*.—Flowers unisexual. Fruit composite. Carpels fixed to a central column, but distinct from each other, opening. Seed-covering testaceous. Albumen fleshy and farinaceous. Embryo homotrope, arched.

GENERA.

<i>Didymotheca</i> , <i>Hook.</i>	<i>Gyrostemon</i> , <i>Desf.</i>
<i>Cyclotheca</i> , <i>Moq.</i>	<i>Codonocarpus</i> , <i>A. Cunn.</i>

TRIBE 3. *Tersonieæ*.—Flowers unisexual. Fruit composite. Carpels fixed to a central column, and slightly united together, unopening. Seed-covering membranaceous. Albumen wanting. Embryo conduplicate.

GENUS AND SYNONYME.

Tersonia, *Moq.*
Gyrandra, *Moq.*

GEOGRAPHICAL DISTRIBUTION.—These are found in the tropical and sub-tropical regions of the whole world. They are frequently met with in America; and they are rarer in Asia than in Africa.

PROPERTIES AND USES.—Many are possessed of acrid virtues, and act as drastic purgatives. *Petiveria alliacea* has a strong nauseous smell of garlic, which it communicates to the milk and flesh of animals that browse upon it, and it is said that this odour drives away insects. The negroes in the West Indies employ a decoction of the leaves against poisoning with

delirium; and the root, which is called *rais de pipi* in Brazil, is used by the natives as a sudorific in paralysis. A decoction is formed, and the patient, after being subjected to the influence of the vapour, is placed in bed, and an abundant perspiration takes place, which frequently restored the use of the paralysed member. The fruit of *Rivina lævis*, Aublet says, is good against indigestion, and those of some of the species yield a red dye. *Phytolacca decandra*, or *Virginian Poke*, is a native of North America, where its young shoots, when cooked, are eaten as asparagus, and the young leaves as spinach. But when the plant gets more matured, it is purgative and emetic, two spoonfuls of the juice purging actively. Applied externally, it irritates the skin and heals foul ulcers. It is employed internally in syphilitic rheumatism, cutaneous eruptions, the itch, ringworm, and hemorrhoids. The berries contain a reddish juice, which is used to colour white wine; and in Portugal an order exists to cut down all the *phytolacca* before flowering to prevent the fraud. Infused in spirits, the fruit is a popular remedy in the United States for chronic rheumatism, and is considered equal to Guaiacum. Thickened into an extract, the juice has been employed against scrofulous and cancerous ulcers. The fruit is purgative, and pigeons which eat them become purgative also, when they are eaten. *P. drastica* purges violently. The young shoots of *P. acinosa* eaten in the Himalayas, as are those of *P. octandra* in Cayenne.



ORDER CLV.—AMARANTACEÆ—AMARANTHS.

HERBS or somewhat shrubby plants. *Leaves* alternate, or rarely opposite, simple, and without leaflets at their base. *Flowers* small, generally hermaphrodite, sometimes unisexual, arranged in spikes, panicles or heads, and separated from each other by three scaly bracts, of which one is large. *Perianth* persistent, with four or five deep divisions. *Stamens* from three to five, hypogynous, sometimes united by their filaments into a tube bearing the anthers on its internal surface, occasionally partly abortive; *anthers* one or two-celled. *Ovary* free, one-celled, containing one erect ovule sometimes borne on a very long curved support, from the summit of which it is pendent; rarely many-ovuled. *Style* simple, or wanting, terminated by two or three stigmas on their internal surface. *Fruit* one or many-seeded, either a seed-nut, or a capsule opening circularly, very rarely a berry. *Seeds* lenticular-kidney-shaped, with a copious albumen round which the embryo is curved, with the radicle inferior and next the hilum.

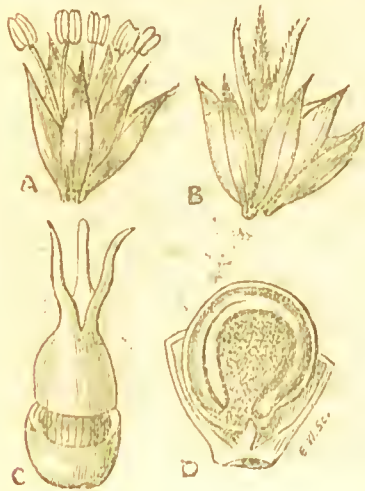


Fig. 183. A, Male flower of *Amarantus paniculatus*; B, female ditto; C, fruit; D, section of seed, showing the embryo.

TRIBE 1. Celosieæ.—Anthers two-celled. Ovary many-ovuled. Leaves alternate.

GENERA AND SYNONYMS.

* *Stamens free.*

Cladostachys, D. Don.

** *Stamens united at the base.*

<i>Deeringia</i> , R. Br.	<i>Henonia</i> , Moq.	„ <i>Lophoxera</i> , Raf.	„ <i>Lestibudesia</i> ,
<i>Coilosperma</i> , Raf.	<i>Celosia</i> , L.	„ <i>Sukana</i> , Raf.	[<i>Thouars</i> .

*** *Stamens inserted at the base, and with sterile, stamen-like bodies (staminodia) placed between them.*

Hermstædtia, Reichb.
Berzelia, Mart.
Langia, Endl.

„ *Hyparete*, Raf.
Pelianthus, E. Meyer.

TRIBE 2. Achyrantheæ.—Anthers two-celled. Ovary one-ovuled.

SUB-TRIBE 1. AMARANTIDÆ.—*Flowers* hermaphrodite, or unisexual, crowded together with three, or without bracts. *Lateral abortive flowers* wanting. *Fruit* opening circularly.

GENERA AND SYNONYMES.

* *Stamens free.*

Amarantus, *L.*
Pyxidium, *Mön.*
Glomeraria, *Cav.*

Dimeianthus, *Raf.*
Sarratia, *Moq.*

** *Stamens united at the base.*

Chamissoa, *H. B. K.*
Allmania, *R. Br.*
Lagrezia, *Moq.*

Acroglochis, *Schrad.*
Blitanthus, *Rehb.*
Leeanocarpus, *Nees.*

Acroglochis, *W. Ger.*
Hablitzia, *Bieb.*
Hablizia, *Sp.*

SUB-TRIBE 2. *ÆRVIDÆ*.—*Flowers hermaphrodite, or unisexual, crowded together, accompanied with three or one, rarely two, bracts; the abortive lateral flowers wanting. Fruit unopening.*

GENERA AND SYNONYMES.

* *Stamens free.*

<i>Amblogyna</i> , <i>Raf.</i>	<i>Mengea</i> , <i>Schauer.</i>	<i>Euxolus</i> , <i>Raf.</i>	<i>Pentricus</i> , <i>Raf.</i>
<i>Romeria</i> , <i>Medik.</i>	<i>Scleropus</i> , <i>Schrad.</i>	<i>Albersia</i> , <i>Kunth.</i>	<i>Acnida</i> , <i>Mitch.</i>

** *Stamens united at the base. Staminodia wanting.*

Banalia, *Moq.*
Psilotrichum, *Bl.*
Leiospermum, *Wall.*

Psilostachys, *Hochst.*
Ptilotus, *R. Br.*

Trichinium, *R. Br.*
Lachnostachys, *Hook.*

*** *Stamens united at the base, with sterile, stamen-like bodies (staminodia) placed between them.*

<i>Ærva</i> , <i>Forsk.</i>	<i>Sericoma</i> , <i>Fenzl.</i>	<i>Nyssanthes</i> , <i>R. Br.</i>	<i>Charpentiera</i> , <i>Gaud.</i>
<i>Ærua</i> , <i>Juss.</i>	<i>Kyphocarpa</i> , <i>Fenzl.</i>	<i>Achyranthes</i> , <i>L.</i>	<i>Rodetia</i> , <i>Moq.</i>
<i>Hemiærva</i> , <i>Fenzl.</i>	<i>Euchnoa</i> , <i>Fenzl.</i>	<i>Centrostachys</i> , <i>Wall.</i>	

SUB-TRIBE 3. *DESMOCHLETIDÆ*.—*Flowers hermaphrodite, in a cluster, or crowded together, accompanied with three bracts. Lateral flowers sterile, changing at length into a crest or awn. Fruit unopening.*

GENERA AND SYNONYMES.

* *Staminodia wanting.*

Digera, *Forsk.*
Saltia, *R. Br.*
Seddera, *Hochst.*

Pupalia, *Juss.*
Desmochæta, *DC.*

** *Staminodia present.*

Cyathula, *Lour.*
Desmochæta, *H. B. K.*
Pupalia, *Mart.*

„ *Syama*, *Jones.*
Polyscalis, *Wall.*

SUB-TRIBE 4. *POLYCNEMIDÆ*.—*Flowers hermaphrodite, solitary, with two bracts; the lateral abortive ones wanting. Fruit unopening.*

GENERA.

Hemichroa, *R. Br.*Polycnemum, *L.*

TRIBE 3. Gomphreneæ.—Anthers one-celled. Ovary one-ovuled.

GENERA AND SYNONYMES.

* *Stamens free.*Gossypianthus, *Hook.*Irensis, *Moq.*** *Stamens united at the base. Staminodia wanting*

Guilleminia, <i>Kunth.</i>	Crucita, <i>L.</i>	„ Hebanthe, <i>Mart.</i>	Ninanga, <i>Raf.</i>
Iresine, <i>P. Br.</i>	Gomphrena, <i>L.</i>	Pfaffia, <i>Mart.</i>	Xerosiphon <i>Turez</i>
Philoxerus, <i>Mart.</i>	Amarantoides, <i>T.</i>	Schultesia <i>Schrad</i>	Allochlamys, <i>Moq.</i>
Rosen, <i>Mart.</i>	Caraxeron, <i>Vaill.</i>	Bragantia, <i>Vand</i>	Pleuropetalum,
Xerandra, <i>Raf.</i>	Sertuenera, <i>Mart.</i>	Wadapus, <i>Raf.</i>	[<i>Hook.</i>
Cruzeta, <i>Loffl</i>			

* * *Stamens united at the base, and with staminodia between them.*

Alternanthera,	Cladanthrix, <i>Nutt.</i>	Brandesia, <i>Mart.</i>	Hoplotheca,
[<i>Forsk.</i>	Telanthera, <i>R. Br.</i>	Mogiphanes <i>Mart</i>	[<i>Martens.</i>
Tromsdorfia <i>Mart</i>	Bucholzia, <i>Mart.</i>	Frölichia, <i>Mön.</i>	? Phyllepidium, <i>Raf</i>
Allaganthera,	Steiremis, <i>Raf.</i>	Oplothea, <i>Nutt.</i>	? Tryphera, <i>Bl.</i>
[<i>Mart.</i>			

GEOGRAPHICAL DISTRIBUTION.—The Amaranths are met with most abundantly between the tropics, and of these the greatest number grow in America. Beyond the tropics they are not so plentiful, and from the cold regions they are wholly excluded.

PROPERTIES AND USES.—Many of the Amaranths abound in mucilage and sugar, and are used as potherbs. Some have slightly astringent properties; others are diaphoretics and diuretics, and a few are tonics, and stimulants. The leaves of *Deeringia baccata* are bitter and acrid, and are used in Java as a remedy against smallpox. *Celosia paniculata* is used in the West Indies as an astringent in dysentery and inflammations, as are also the flowers of *C. cristata*, the well-known *Cockscomb*, which are administered in Asia in cases of diarrhœa, blenorrhœa, and menorrhagia. The leaves of *Amarantus blitum*, a wild plant in Britain, are eaten in France in the same way as spinach; and in India the same use is made of *A. farinaceus*. *A. (Amblogyna) polygonoides*, a common garden weed in India, is also used as a potherb, and considered so wholesome that convalescents are ordered it in preference to all other kinds. *A. tristis* is held in great esteem by the natives, and may be cut down several times without destroying the plants, which are much used as food. The tops of the young stems of *A. (Euxolus) oleraceus* were formerly brought to table in India, as a substitute for asparagus, and those of *A. lanceolatus* are eaten by the natives in their curries. The seeds of *A. frumentaceus*, called *Kiery*, and *A. anardana* are ground into flour, and these plants are cultivated as a regular crop in India for the supply of their seeds. In South America the same use is made of the leaves of *A. celosioides*. Some

of the species are old favourites as garden flowers—such as *A. hypochondriacus*, known as *Prince's Feather*, and *A. caudatus*, as *Love-lies-bleeding*. The latter is considered astringent, and a decoction of the flowers has been administered in spitting of blood, and various hemorrhages, and it has been said to be so energetic that it may be used in cases of menorrhagia. An infusion of the root of *Achyranthes aspera* is given in India as a mild astringent in bowel complaints. The flowering spike, made into pills with a little sugar, is a popular preventive medicine in Behar for persons bitten by rabid dogs. The root is used by the natives as a toothbrush, and the whole plant, when macerated, yields a considerable quantity of potash. *Cyathula (Pupalia) prostrata* is held in high estimation by the South American Indians for many diseases, and the ashes of the plant are a celebrated medicine in cutaneous affections. The root of *Pupalia atropurpurea*, is considered in India efficacious in flatulence and hemorrhoids. *Gomphrena officinalis*, and *macrocephala*, both natives of Brazil, are held in great estimation by the inhabitants, who regard the root as a panacea. They call them peratodo, which signifies heal-all, a name applied by these people to many other substances. They consider the root, which has a nauseous taste, as good in intermittent fevers, colic, diarrhœa, for strengthening the stomach, and for the bites of serpents, but it is very doubtful, whether it is the bark of the root of this plant which constitutes the drug so called, as all the individuals of the family are not remarkable for any active properties.



ORDER CLVI.—SALSOLACEÆ—SALTWORKS.

HERBS, or woody plants.

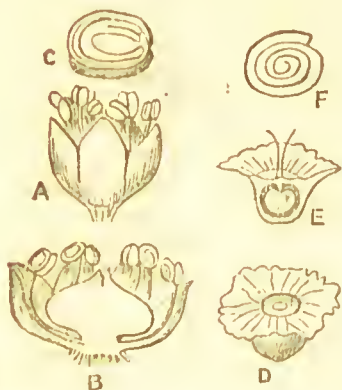


Fig. 184. A, Flower of *Chenopodium album*; B, section of ditto; C, ditto of seed; D, perianth of *Salsola kali*, in flower; E, section of ovary; F, embryo of ditto.

Leaves alternate, rarely opposite, entire, or more or less divided, without leaflets at their base. *Flowers* hermaphrodite, or unisexual, small, of a greenish colour, and arranged in racemes, or in clusters in the axils of the leaves. *Perianth* persistent, with three, four, or five lobes, and sometimes tubular at the base. *Stamens* one to five, inserted on a disk, which lines the base of the perianth. *Ovary* free, rarely united to the calyx, one-celled, containing a single, erect ovule, which is sometimes supported on a stalk. *Style* rarely simple, with two, three, or five divisions, each terminated by a stigma. *Fruit* a seed-nut, or berry, one-celled, un-opening, membranous, or leathery. *Seed* horizontal or vertical, erect or inverse, lens-shaped, or kidney-shaped. *Embryo* curved, or annular, enclosing a copious or spare albumen; or in a flat spiral, separating two masses of albumen; or in a spiral cone, without albumen. *Radicle* directed towards the hilum.

SUB-ORDER I.—CYCLOLOBEÆ.

Embryo annular. Albumen abundant, rarely spare, lying altogether enclosed by the embryo.

TRIBE 1. Chenopodieæ.—Flowers generally hermaphrodite, all of one shape. Fruit generally distinct. Seed-covering double. Stalk continuous. Leaves membranous, more or less triangular-rhomboid.

GENERA AND SYNONYMS.

* *Seed horizontal.*

<i>Rhagodia</i> , R. Br.	<i>Teloxys</i> , Moq.	<i>Chenopodium</i> , Moq.	„ <i>Pes Anserinus</i> ,
<i>Aphanisma</i> , Nutt.	<i>Cycloloma</i> , Moq.	<i>Oligandra</i> , Less.	[Koch.
<i>Cryptanthus</i> Nutt.	<i>Amoreuxia</i> , Moq.	<i>Oliganthera</i> , Endl.	<i>Botrydium</i> , Spach
<i>Beta</i> , T.	<i>Cyclolepis</i> , Moq.	<i>Lipandra</i> , Moq.	<i>Ambrina</i> , Moq
<i>Oreobliton</i> , Durieu.	<i>Amorea</i> , Del.	<i>Gandriloa</i> , St.	<i>Botrys</i> , Koch.

** *Seed vertical.*

<i>Roubieva</i> , Moq.	<i>Agathophyton</i> , Moq.	<i>Dysphania</i> , R. Br.
<i>Blitum</i> , T.	<i>Monolepis</i> , Schrad.	<i>Bosia</i> , L.
<i>Morocarpus</i> , Ad.	<i>Cryptocarpus</i> , H. B. K.	

TRIBE 2. *Spinaciæ*.—Flowers diclinous, male and female of different forms. Fruit distinct, or adherent. Covering of the seed double or single.

GENERA AND SYNONYMES.

* *Covering of the seed double.*

Exomis, Moq.	„ Pterochiton, Torr	Halimus, Wallr.	Axyris, L.
Atriplex, Gärt.	Lophocarya, Nutt	Ceratocarpus Pall	Spinacia, T.
Obione, Gärt.	Pterocarya, Nutt.	Theleophyton, Moq.	Oxybasis, Kar. & K.

** *Covering of the seed simple.*

Grayia, Hook. & A.	„ Krascheninniko-	„ Guldenstädtia,	Ceratocarpus, Buxb.
Grayia, Endl.	[via, Gulden.	[eck.	Ceratoides, T.
Eurotia, Ad.	Deolis, Schreb.	Ceratosperrum,	Pugionium, Gärt.
		[Pers.	

TRIBE 3. *Camphorosmeæ*.—Flowers hermaphrodite, or polygamous, rarely monœcious, all of one shape. Fruit distinct. Integument of the seed simple. Stalk continuous. Leaves membranous or fleshy, linear or somewhat terete.

GENERA AND SYNONYMES.

* *Seed vertical.*

Anisacantha, R. Br.	Panderia, F & M.	Kirilowia, Bunge.	Camforosma, C.
Sclerolæna, R. Br.	Pterochlamys,	Camphorosma, L.	[A. M.
Didymanthus, Endl	[Fisch.	Camphorata, T.	Threlkeldia, R. Br.

** *Seed horizontal.*

Enchylæna, R. Br.	Kochia, Moq.	„ Bassia, All.	Suaeda, Reichb.
Londesia, F. & M.	Villemetia, R. Br	Willemetia Markl	Kentropsis, Moq.
Chenolia, Th.	Echinopsilon, Moq.	Kochia, R. Br.	Centropsis, Endl.
Maireana, Moq.			

TRIBE 4. *Corispermæ*.—Flowers hermaphrodite, all of one shape. Fruit adherent, rarely distinct. Stem continuous. Leaves leathery, linear.

GENERA AND SYNONYMES.

Agriophyllum, Bieb.	Corispermum, A. Juss.	Wallinia, Moq.
Rhagrostis, Buxb.	Anthochlamys, Fenzl.	Lophiocarpus, Turcz.

TRIBE 5. *Salicorniæ*.—Flowers hermaphrodite, all of one shape. Fruit adherent or distinct. Covering of the seed simple or double. Stalk jointed. Leaves succulent, scale-like, or wanting.

GENERA AND SYNONYME.

Salicornia, Moq.	Halostachys, C. A. M.	Arthrocnemum, Moq.
Kalidium, Moq.	Halocnemum, Bieb.	Salicornia, T.

SUB-ORDER II.—SPIROLOBÆ.

Embryo spiral. Albumen wanting, rarely spare; in two separate eccentric masses.

TRIBE 6. *Suædeæ*.—Flowers with very minute bracts, hermaphrodite, all shaped alike. Embryo coiled in a flat spiral form. Stalk continuous. Leaves succulent, shaped like worms.

GENERA AND SYNONYMES.

* *Seed vertical.*

Schanguinia, <i>C.A.M.</i>	Suæda, <i>Moq.</i>	Trikalis, <i>Raf.</i>	Alexandra, <i>Bunge.</i>
Sevada, <i>Moq.</i>	Lerehia, <i>Hall.</i>	Belowia, <i>Moq.</i>	Pterocalyx, <i>Schrk.</i>

** *Seed horizontal.*

Chenopodina, <i>Moq.</i>	Brezia, <i>Moq.</i>
Schoberia, <i>Nees.</i>	Calvelia, <i>Moq.</i>
Schoberia, <i>Moq.</i>	

TRIBE 7. *Salsolæ*.—Flowers hermaphrodite, bracteate, all of one shape. Fruit distinct. Seeds horizontal or vertical. Seed-covering simple, membranous. Embryo coiled in the form of a spiral cone, generally green. Stalk continuous or jointed. Leaves generally half-cylindrical, succulent.

GENERA AND SYNONYMES.

* *Seed horizontal.*

Helicilla, <i>Moq.</i>	Traganum, <i>Del.</i>	„ Halothamnus,	Salsola, <i>Gärt.</i>
Horaninovia, <i>F. & M.</i>	Caroxylon, <i>Th.</i>	[<i>J. & S.</i>]	Sarcomorphis <i>Boj</i>

** *Seed vertical.*

Halimocnemis, <i>C.</i>	Halocharis, <i>Moq.</i>	Cladolepia, <i>Moq.</i>	Anabasis, <i>L.</i>
[<i>A.M.</i>]	Androphysa, <i>Moq.</i>	Halanthium, <i>Koch.</i>	Brachylepis, <i>C.A.M.</i>
Nanophyton, <i>Nees.</i>	Physogeton, <i>J. & S.</i>	Halogeton, <i>C.A.M.</i>	Cornulaca, <i>Del.</i>
Camphoropsis <i>Mq</i>	Ofaiston, <i>Raf.</i>	Noæa, <i>Moq.</i>	Phylloxys, <i>H. P.</i>

DOUBTFUL GENUS AND SYNONYME.

Fremontia, *Torr.*
Sarcobatus, *Nees.*

GEOGRAPHICAL DISTRIBUTION.—Most common in extratropical and temperate regions, where they are common weeds, frequenting waste places, among rubbish, and marshes by the sea-shore. In the tropics they are rare.

PROPERTIES AND USES.—The family is characterised by the great quantity of mucilage, sugar, starch, and alkaline salts that are found in the individuals composing it. Many of them are used as potherbs, some are emetic, purgative, and vermifuge in their medicinal properties.

Common Beet (*Beta vulgaris*) produces several varieties, of which the best known are *Garden Beet*, *Sugar Beet*, and *Mangold Wurtzel*. The root of *Garden*, or *Red Beet*, is exceedingly wholesome and nutritious; and Dr. Lyon Playfair has recommended that a good brown bread may be made by rasping down this root with an equal quantity of flour. He says that

the average quality of flour contains about 12 per cent. of azotised principles, adapted for the formation of flesh, and the average quality of beet contains about 2 per cent. of the same materials. Now 14 lbs. of wheat contains 1.68 lb., and 14 lbs. of beet contains 0.28 lb. of flesh-forming matter, from which the market value of the materials must be calculated; and thus six stones of beet, costing one shilling, are equal to one stone of flour, costing two shillings and fourpence. *Sugar Beet*, called also *Chard Beet*, is *B. vulgaris* var. *cicla*. It is cultivated in gardens for the large mid-ribs of the leaves, which, when boiled, form an excellent vegetable. It is from the root of this and Mangold Wurtzel that *Beet Sugar* is made. The quantity of sugar varies from 8 to 12 per cent, but a portion of it is rendered uncrySTALLISABLE during the process of manufacture. It is extracted from the roots by first reducing them to a pulp between two cylinders, putting the pulp into bags, and pressing out the juice. The liquor is then boiled, and the saccharine matter precipitated by quick lime; the liquor is poured off, and to the residue is added a solution of sulphuric acid, and again boiled. The lime uniting with the acid is got rid of by straining, and the liquor is then gently evaporated, or left to granulate slowly, after which it is ready to undergo the common process of refining sugars. So improved is the mode of making this sugar, that the French manufacturers extract 12 lbs. from 100 lbs. of beet, in twelve hours. *Mangold Wurtzel* has now become a plant of great importance to the farmer, as furnishing an abundance of valuable and nutritive fodder for cattle, both in its roots and leaves. It also yields sugar, like the *Sugar Beet*, and is extensively cultivated for that purpose. It also makes a good domestic ale, and a considerable quantity of alcohol is obtained from it by distillation.

Chenopodium vulvaria, or *Stinking Goosefoot*, is a common plant in Britain, near the sea coast. It has an intolerable fetid odour, resembling that of decaying fish, and the leaves have a greasy feel, when rubbed between the fingers; it is said to be antispasmodic and emmenagogue. The seeds of *C. quinou*, which are produced in great abundance, are extensively used in Chili and Peru, as an article of food, under the name of small rice, and the leaves are used like spinach. The plant is now not unfrequently cultivated for the same purposes in the gardens of this country. *C. ambrosoides* has a strong, aromatic odour, and is used frequently in Mexico instead of tea. It is much grown in France, where the infusion of it is considered highly beneficial in nervous diseases. *C. anthelmintica* is extensively cultivated in the United States, under the name of *Wormseed*, and its fruit is considered one of the most efficient anthelmintics for the expulsion of round worms in children; but the essential oil which it yields is more frequently given than the fruit. *Blitum capitatum* is what used to be grown in flower-gardens, under the name of *Strawberry Spinach*. *B. bonus Henricus*, called in this country *Good King Harry*, *Garden orach* (*Atriplex hortensis*), *Prickly Spinach* (*Spinacea oleracea*), and *Round Spinach* (*S. glabra*), are well-known garden vegetables. *Camphorosma monspeliensis*, and *Kochia scoparia* (*Belvedere*), were formerly considered diaphoretic and diuretic. Several species of *Salsola*, *Suæda*, and *Salicornia*, yield the *Soda* of commerce.

ORDER CLVII.—POLYGONACEÆ.—BUCKWHEATS.

HERBS, shrubs, and sometimes trees. *Leaves* alternate, sheathing the stem at their base, or adherent to a membranous, sheathing stipule, and rolled back on their midrib when young. *Flowers* hermaphrodite, or unisexual, regular, arranged in cylindrical spikes, or in terminal racemes. *Perianth* with four or six divisions, either free or united at their base, sometimes arranged in two series, and imbricate before opening. *Stamens* three to nine, inserted in an annular, glandulous disk, free; *anthers* bursting longitudinally. *Ovary* free, triangular, ocellated, containing one erect ovule. *Styles* two, or three, each terminated by a stigma. *Fruit* generally triangular, dry, and unopening, sometimes covered by the persistent perianth. *Seed* with a cylindrical embryo on one side, partially encircling mealy albumen, and with a superior radicle.



Fig. 185. *Polygonum pennsylvanicum*. A, Flower; B, section of ovary, showing the erect ovule; C, section of seed, showing the embryo on one side of the albumen.

TRIBE 1. *Erigoneæ*.—Flowers girded by a common involucre, hermaphrodite, rarely polygamous. Sheathing stipules wanting.

GENERA AND SYNONYMES.

Erigonum, Mx.
Encycla, Nutt.
Stenogonum, Nutt.
Espinosa, Lag.
Oxytheca, Nutt.
Brisegnoa, Remy.
Tetraraphis, Miers.

Nemacaulis, Nutt.
Chorizanthe, R. Br.
Trigoneocarpus, Bart.
Mucronea, Benth.
Centrostegia, A. G. R.
Pterostegia, F. & M.

TRIBE 2. *Polygoneæ*.—Flowers without an involucre. Leaves furnished with sheathing stipules.

GENERA AND SYNONYMES.

* *Fruit* two to four-angled, and the angles expanded into a wing, or crest. *Embryo* axile.

<i>Calligonum</i> , L.	<i>Pallasia</i> , L. f.	<i>Pteropyrum</i> , Spach.	<i>Oxyria</i> , Hill.
<i>Polygonoides</i> , T.	<i>Calligonum</i> , Lam.	<i>Rheum</i> , L.	<i>Donia</i> , R. Br.
<i>Pterococcus</i> , Pall.	<i>Callyphysa</i> , F. & M.	<i>Rhabarbarum</i> , T.	<i>Oxygonum</i> , Burch.

**** Angles of the fruit not winged. Embryo lateral, rarely axile.**

Ceratogonum, <i>Msn.</i>	Polygonella, <i>Mx.</i>	Helxine, <i>L.</i>	Sarcogonum, <i>Don</i>
Owenia, <i>Hilsen.</i>	Lyonia, <i>Raf.</i>	Lagunea, <i>Lour.</i>	Coccoloba, <i>Jacq.</i>
Emex, <i>Neck.</i>	Stopinaca, <i>Raf.</i>	Antenoron, <i>Raf.</i>	Campderia, <i>Benth.</i>
Vibo, <i>Mön.</i>	Gonopyrum, <i>Cam</i>	Ampelygonum,	Podopterus, <i>H. & B.</i>
Centropodium,	Thysanella, <i>A. Gr.</i>	[<i>Lndl.</i>	Triplaris, <i>Loffl.</i>
[<i>Burch.</i>	Königia, <i>L.</i>	Echinocaulos,	Blochmannia,
Podocentrum <i>Burch</i>	Polygonum, <i>L.</i>	[<i>Hassk.</i>	[<i>Weigelt.</i>
Rumex, <i>L.</i>	Bistorta, <i>T.</i>	Chitocalyx, <i>Hassk</i>	Valesquezia, <i>Bert</i>
Atraphaxis, <i>L.</i>	Persicaria, <i>T.</i>	Fagopyrum, <i>T.</i>	Ruprechtia, <i>C.A.M.</i>
Tragopyrum <i>Bieb</i>	Tovara, <i>Ad.</i>	Mühlebeckia, <i>Msn</i>	Magonia, <i>Vell.</i>

TRIBE 3. Brunnichieæ.—Flowers without an involuere, hermaphrodite. Ovary free, three-angled. Ovule, pendulous from a long, free, basilar funicle; at length erect. Leaves without sheathing stipules.

GENERA AND SYNONYMES.

Antigonum, *Endl.*
Brunnichia, *Banks.*
Rayania, *Walt.*

TRIBE 4. Symmerieæ.—Ovary adhering to the inner lobes of the perianth. Leaves without sheathing stipules.

GENERA AND SYNONYMES.

Symmeria, *Benth.*
Thurnheyssera, *Mart.*

Amalobotrya, *Kunth.*
? Lastarria, *Remy.*

GEOGRAPHICAL DISTRIBUTION.—These are found in one form or another in almost every part of the habitable globe; those of the temperate regions frequenting ditches, and waste places, fields, mountains, and heaths; from the poles to the tropics some individuals of the family are to be met with.

PROPERTIES AND USES.—In almost all the species of the family the root and leaves have an astringent or acidulous taste, which is attributable, in the first instance, to tannin and gallic acid, and, in the second, to oxalic acid. The fruits of several are farinaceous, and furnish a nutritious food. In the Water Pepper, however, we find an exception to the others, for in it we meet with acid and peppery properties.

The root of *Pterococcus aphyllus*, a native of the sandy steppes of Siberia, when cut, exudes a clear, viscid gum, similar to tragacanth, which swells in water, and forms a mucilage of a brownish-yellow colour; it is said to be eaten by the Calmucks in times of scarcity. It contains a yellow colouring-matter, like that of some species of Rheum. The Calmucks make fumigations of the wood, by throwing it on the fire, to cure sore eyes, and they eat the acid fruit to quench their thirst. *Coccoloba uvifera* is a native of the West Indies, where it is called *Sea-side Grape*, from the bunches of its violet-coloured calyx, in which the nuts are enveloped. The fruits are fleshy, agreeably acid, and eaten with sugar. They are esteemed antidyenteric and astringent, and serve to make refreshing drinks, and even a sort of wine. The wood is heavy, hard, and durable, beautifully

veined, and contains an astringent, reddish juice, which being inspissated, forms a sort of false kino. The bark is bitter, and very astringent; the wood dyes red; the leaves are worn on the head, under the hat, to preserve it from the sun; and the seeds are purgative. The clustered currant-like fruit of *Mühlenbeckia adpressa* have a sweetish taste, and are used in the penal settlements of Australia to make pies and puddings. The branches and trunk of *Triplaris americana* are chambered like those of *Cecropia*, and serve for the habitations of light-brownish ants, which inflict a most painful bite. *T. Bonplandiana* is frequented by another ant, a species of *Myrmica*, which forms galleries in the trunk, where it swarms in hundreds.

Garden Sorrel, which is cultivated for the agreeable acidity of its leaves, is *Rumex acetosa*. The leaves of *R. acetosella*, and of *R. scutata*, are used for the same purpose, as are also those of *R. vesicarius* eaten by the Hindoos, and by them regarded as aperient and diuretic. All the species of *Rumex* having this acidity in the leaves are called *Sorrels*, while those that are destitute of it are known by the name of *Docks*. The fruit of *Fagopyrum esculentum*, or *Buckwheat*, furnish a nutritious diet, used in the countries of Northern Europe.

It is well known that the drug called *Rhubarb* is the root of some species of *Rheum*, but with such jealousy is the traffic in this article guarded, and so difficult of access is the region where it is produced, that no accurate information has yet been obtained, as to what or how many different species produce it. All the species possess the same properties, in a greater or less degree, but it is generally believed that *R. palmatum*, *undulatum*, *Rhaponiticum*, and *australe* are those from which the commercial supply is obtained. Rhubarb is produced abundantly in the elevated lands of Tartary, Chinese Tartary, Thibet, and Bhotan. It is not cultivated, but springs up spontaneously, wherever the seed has been distributed in places favourable for germination. The root is not considered fit for use till it is six years old, when it is dug up twice a year—in Tartary in spring and autumn, and in China only in winter. When it is taken up, the bark is removed, the root cut in pieces, with holes through them, and hung up to dry, upon cords about the tents, or on the horns of sheep. There are four varieties of the root known in commerce. *Russian Rhubarb* is brought by the Bucharian merchants to the frontier town of Kiachta, where an apothecary, appointed by the government, is stationed, and who submits it to a rigid inspection. All that does not pass this examination is burned, while the best is sent overland to Moscow and St. Petersburg, and exported by the Baltic to various parts of the world. *Turkey Rhubarb* is collected by the Chinese Tartars, and sold to the Bucharians, who bring it to Bokara, Samarcand, and other cities of Central Asia; whence, in the ordinary course of commerce, it passes to the Levant and Constantinople. *Chinese Rhubarb* is of an inferior quality, and imported from Canton. Much of this is, in all probability, from the same source as the Russian; but its inferiority is attributable to the great care observed by the Russian authorities in the selection. *Indian Rhubarb* is produced in the Himalayas. As an ingredient in pies and puddings, the long, thick leaf-stalks are well known.

ORDER CLVIII.—CEPHALOTACEÆ.—CEPHALOTUS FAMILY.

AN herb. *Leaves* all proceeding from the root, and stalked, some of



Fig. 186. Flower of *Cephalotus follicularis*, greatly magnified; A, ditto, natural size; B, pistil of ditto; C, a carpel open, showing the ovule.

them are elliptical and flat, and others formed into the shape of pitchers, like those of the Pitcher plant, and the Side-saddle flowers, which are generally filled with water, and closed by a lid. *Flowers* hermaphrodite, small, white, and arranged in a sort of corymb, on a scape-like footstalk. *Perianth* coloured, deeply six-cleft, the segments valvate in æstivation, thickened at the base, where they are covered with small papillæ. *Stamens* twelve, alternately shorter, inserted at the margin of the tube, shorter than the limb; *filaments* awl-shaped; *anthers* with a thick, granular connective, two-celled, bursting longitudinally. *Ovaries* six, arranged in a circle, round a small tuft of hairs, each containing one erect ovule, very rarely two. *Fruit* a membranous, akene, girded by the per-

sistent perianth and stamens. *Seed* one, rarely two, erect, inserted in the base of the cavity of the internal membrane. *Embryo* very short, situated in the base of an oily, fleshy albumen, with plano-convex seedlobes, and an inferior radicle.

GENUS.

Cephalotus, Labill.

This family consists of only one individual, a native of the marshes of Australia. It is called *Cephalotus follicularis*, or *Australian Pitcher Plant*, from having some of its leaves formed into pitchers, which contain water, and are covered by a lid. This plant was first discovered by Labillardière, who found it in Leuwin's Land, and figured and described it in his "*Novæ Hollandiæ plantarum specimen*;" and it was again found by Mr. Robert Brown, during his voyage with Captain Flinders, in the neighbourhood of King George's Sound.

ORDER CLIX.—TETRAGONIACEÆ—AIZOONS.

HERBS, or small shrubs. *Leaves* alternate, thick, and succulent.

Flowers hermaphrodite, regular, placed in the axils of the leaves. *Perianth* either free, or adherent to the ovary, three to five-cleft, rarely two-cleft. *Stamens* definite, or indefinite in number. *Ovary* two to nine-celled, sometimes one-celled by abortion; ovaries solitary or numerous, inverted, ascending, or suspended, and always with a long cord; *styles* equal in number to the cells of the ovary, distinct. *Fruit* either a horned, winged, or unopening nut, a two to five-celled capsule, opening at the apex of the cells, or a capsule opening circularly with a lid. *Seeds* either solitary or numerous, ascending or pendulous. *Embryo* curved round the mealy albumen, and the radicle directed towards the hilum.



Fig. 187. *Tetragonia expansa*.
A, Fruit; B, section of ditto;
C, ovule; D, section of a
seed.

TRIBE 1. *Tetragoniæ*.—Ovary three to nine-celled; ovules solitary. Fruit a horned or winged drupe or nut, unopening. Seeds solitary or pendulous.

GENERA AND SYNONYMES.

Tetragonia, L.
Demidovia, Pall.

Tetragonocarpus, Commel.
Tetragonella, Miq.

TRIBE 2. *Aizoideæ*.—Capsule woody, two to five-celled, opening at the top of the cells. Seeds numerous, pendulous from the summit of the central column.

GENERA AND SYNONYMES.

Aizoon, L.
Veslingia, Fab.

Ficoideæ, Dill.
Galenia, L.

„ *Sialodes*, B. & Z.
Kolleria, Presl.

Plinthus, Fenzl.

TRIBE 3. *Sesuvieæ*.—Ovary one to five-celled; ovules numerous. Capsule opening circularly with a lid.

GENERA AND SYNONYMES.

Trianthema, Sauv.
Papularia, Forsk.
Diplochonum, Fenzl.

Sesuvium, L.
Aizoon, Andr.
Halimus, Löffl.

Pyxipoma, Fenzl.
Ancistrostigma, Fenzl.
Cypselca, Turp.

„ *Radiana*, Raf.
Millegrana, Bur.

GEOGRAPHICAL DISTRIBUTION.—These are found at the Cape of Good Hope, in Arabia, and on the shores of the Mediterranean; a very few are met with in Asia, and some inhabit the South Sea Islands.

PROPERTIES AND USES.—The leaves of *Tetragonia expansa*, called *New Zealand Spinach*, are used as spinach. *Sesuvium portulacastrum*, and *S.*

repens are used in the West Indies as potherbs. The species of *Trianthema* are bitter and astringent. From the ashes of *Aizoon canariensis*, and *A. hispanica*, soda is obtained.

ORDER CLX.—BASELLACEÆ—MALABAR NIGHTSHADES.

This small family, composed of climbing, herbaceous, and shrubby tropical plants, has been separated from Chenopodiaceæ on account of the perianth being double and coloured, and the stamens inserted in its sides, instead of in the receptacle; and it differs from Tetragoniaceæ in its simple ovary.

GENERA AND SYNONYMES.

Basella, <i>L.</i>	Auredera, <i>Juss.</i>	Ullucus, <i>Lozano.</i>
Gandola, <i>Rumph.</i>	Clarisia, <i>Abat.</i>	Tourneria, <i>Mog.</i>
Boussingaultia, <i>H.B.K.</i>	Melloca, <i>Lindl.</i>	Tandonia, <i>Mog.</i>

They are all found between the tropics. The leaves of *Basella rubra*, *alba*, and *cordifolia*, are used in India as spinach. The roots of *B. cordifolia* are employed in Java as a cathartic, according to Horsfield. The berries of *B. rubra* yield a purple dye, which is not permanent. The root of *Melloca tuberosa* is eaten by the women of New Grenada for the purpose, as they suppose, of inducing fecundity.

ORDER CLXI.—SCLERANTHACEÆ.—KNAWELS.

A small order, nearly allied to Chenopodaceæ, of which they are a perigynous form.

GENERA AND SYNONYMES.

Mniarum, <i>Forst.</i>	Guilleminia, <i>H. B. K.</i>
Ditoca, <i>Banks.</i>	Habrozia, <i>Fenzl.</i>
Scleranthus, <i>L.</i>	

These are all natives of waste places, in Europe, Asia, and America, beyond the tropics. In Poland a sort of Cochineal insect is found on the roots of *Scleranthus perennis*, which Linnæus called *Coccus polonicus*, and which was formerly employed in Prussia for dyeing red, before the introduction of the true cochineal.

ORDER CLXII.—LAURACEÆ.—LAURELS.

TREES and shrubs.

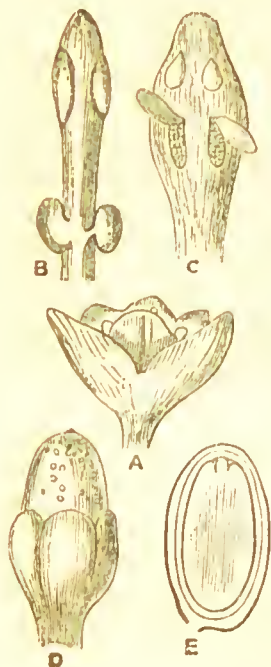


Fig. 188. A, Flower of *Cinnamomum zeylanicum*; B, stamen, with the glands; C, stamen, with the valves open; D, fruit; E, section of the seed.

Leaves alternate, rarely opposite, entire, or seldom lobed. *Flowers* hermaphrodite, or unisexual by abortion, regular. *Perianth* with four to six lobes, imbricate in æstivation, sometimes obsolete. *Stamens* four, eight, or twelve, inserted in two series, in the margin of a disk which lines the base of the perianth; in the interior series the anthers are turned outwards, and in the exterior they are turned inwards; at the base of the filaments there are two appendages, which appear to be abortive stamens. *Anthers* terminal, opening by two or four valves from below upwards. *Ovary* free, one-celled, with one or three suspended ovules. *Style* terminated by a simple stigma. *Fruit* drupaceous, or baccate, one-seeded, girded at the base by the perianth becoming fleshy, in the form of a cup. *Seed* containing a very large embryo, without albumen, having large plano-convex seed-lobes, and a short, superior radicle.

GENERA AND SYNONYMS.

Cinnamomum, *Burm.*
Malabathrum, *Burm.*
Camphora, *Nees.*
Apollonias, *Nees.*
Phœbe, *Nees.*
Nothaphœbe, *Bl.*
Persea, *Gært.*
Eriodaphne, *Nees.*
Nesodaphne, *Hook. f.*
Machilus, *Nees.*
Boldu, *Feuill.*
Alseodaphne, *Nees.*
Hufelandia, *Nees.*
Dehaasia, *Bl.*

Naasia, *Bl.*
Endiandra, *R. Br.*
Dietyodaphne, *Bl.*
Beilsehmedia, *Nees.*
Cecidodaphne, *Nees.*
Cryptocarya, *R. Br.*
Peumus, *Nees.*
Gomortega, *R. & P.*
Adenostemon, *Pers.*
Keulia, *Molin.*
Cyanodaphne, *Bl.*
Caryodaphne, *Bl.*
Agathophyllum, *Juss.*
Evodia, *Gært.*

Ravensara, *Son.*
Mespilodaphne, *Nees*
Aydendron, *N. & M.*
Euonymodaphne,
 [Nees.
Aerodielidium, *Nees*
Misanteca, *Schlt.*
Neetandra, *Rottb.*
Pomatia, *Nees.*
Porostema, *Schrb.*
DieyPELLium, *Nees.*
 ? *Licaria*, *Aub.*
Petalanthera, *Nees.*

Pleurothyrium, *Nees*
Teleiandra, *Nees.*
Leptodaphne, *Nees.*
Ajovea, *Aub.*
Douglasia, *Schrb.*
Ehrhartia, *Scop.*
Gœppertia, *Nees.*
Endlicheria, *Nees.*
Schauera, *Nees.*
Oreodaphne, *Nees.*
Aperiphracta,
 [Nees.]

Agriodaphne,
 [Nees.
Ocotea, *Gært. f.*
Ceramophora,
 [Nees.
Adenotrachelium
 [Nees.
Umbellularia, *Nees*
 ? *Menestrata*, *Fl. Fl.*
 ? *Linharia*, *Arrud.*
Camphoromœa, *Nees*
Ocotea, *Aubl.*

Strychnodaphne
 [Nees.
Sennebiera, *Nees.*
Gyn-nobalanus, *Nees*
Sassafras, *Nees.*
Parthenoxylon, *Bl.*
Benzoin, *Nees.*
Lindera, *Th.*
Calosma, *Prsl.*
Aperula, *Bl.*
Cylicodaphne, *Nees.*
Tetr. nthera, *Jacq.*
Litsea, *Lam.*

„ Tomex, <i>Th.</i>	Fiwa, <i>Gmel.</i>	Lepidadenia, <i>Nees.</i>	Daphnidium, <i>Nees</i>
Berrya, <i>Klein.</i>	Iteadaphne, <i>Bl.</i>	Dodecadenia, <i>Nees.</i>	Litsæa, <i>Juss.</i>
Sebifera, <i>Lour.</i>	Polyadenia, <i>Nees.</i>	Actinodaphne, <i>Nees</i>	Tetradenia, <i>Nees.</i>
Hexanthus, <i>Lour.</i>	Laurus, <i>T.</i>	Lozoste, <i>Nees.</i>	Darwinia, <i>Denn.</i>
Glabraria, <i>L.</i>			

GEOGRAPHICAL DISTRIBUTION.—This family is confined to the cooler regions of the tropics, with a few exceptions, which are found in North America, and the South of Europe.

PROPERTIES AND USES.—There are few of this family which do not contribute to the luxuries or necessities of the human species. They are essentially aromatic in all their parts, and furnish some of the most important articles known in commerce. Among the first in importance of these products is *Cinnamon*, which is the inner bark of *Cinnamomum zeylanicum*, a tree twenty to thirty feet high, and twelve to eighteen inches in diameter. It is a native of Ceylon, but is found over almost the whole of India, the islands of the eastern Archipelago, South America, and the West Indies, in all of which it is cultivated. The whole plant has the same aromatic properties as is found in the bark of commerce. The root has the odour of saffron, and yields a great deal of camphor, by distillation with sea water. The flowers have the smell and taste of the bark, and they furnish both an essential and concrete oil, which is used in the countries where it is obtained against dysentery, fractures, and as a cosmetic. The fruit has a smell somewhat like turpentine, and a taste like juniper berries; it is about the size of a plum, of an oblong form, and black colour. When ripe, a fatty substance is obtained from it, called *Cinnamon Suet*, or *Cinnamon Wax*, by bruising and then boiling it in water, and removing the oily substance which floats on the surface, and allowing it to cool, and become concrete; this is used for making candles, which yield a most delicious odour. The wood has the same smell as the fruit, and is used for making trunks, boxes, and articles of furniture. From the leaves an oil is obtained, which more resembles that of cloves than of cinnamon, and which is sold by traders as oil of cloves. Cinnamon branches are seldom cut less than half an inch, or more than two or three inches in diameter. The bark is removed by making longitudinal incisions, and it is then taken off in strips. The strips are placed one above another, in parcels eight or ten inches thick, and allowed to remain for twenty-four hours, when a fermentation takes place, which facilitates the removal of the outer pellicle, and the green part of the bark. The inner bark is thus left free, and is finally rolled longitudinally into cylinders or long quills, about three feet long, and the smaller quills are pushed within the larger; these are dried on clay, first in the shade, and subsequently in the sun. When packed, black pepper is used to fill the intermediate space, by which it is said that damp is absorbed, and the flavour of the cinnamon preserved.

Oil of Cinnamon is procured by distillation of the pieces of bark, too small for forming into quills. After being coarsely powdered, the bark is soaked in sea-water for two days, and then submitted to distillation. A light and heavy oil come over with the water, the former of which separates in a few hours, and swims on the surface; the latter falls to the bottom of the receiver, and continues to be deposited for ten or twelve days. The specific gravity of the oil is 1.035, and when applied to the tongue it is

excessively hot and pungent. It has the cordial and carminative properties of cinnamon, without its astringency.

Chinese Cinnamon is supposed to be produced by *C. aromaticum*, which grows in China, Sumatra, and other parts of the East; and the flower-buds of this plant, before they expand, are supposed to supply the *Cassia buds* of commerce, although Nees considered them those of *C. Loureirii*. The latter yields an excellent cinnamon, the best of which is said by Loureiro to be even superior to that of Ceylon. There are several other species furnish kinds of cinnamon; and *Cassia*, or *Cassia lignea*, is obtained, according to Dr. Wight, from many different species of the genus. *C. nitidum* is said to have been the chief source of the drug formerly known as *folia malabathrica*, and *C. tamala* that of the Tej-pat leaves of the Indian bazaars. *Culilawan* is the bark of *C. culilawan*, which grows in the Moluccas and Cochin China. It has the same properties as the other aromatics. The bark of *C. javanicum* is bitter and aromatic, and strongly recommended by Blume in spasmodic colic, and the after-pains of labour.

Camphor is obtained from *Camphora officinarum*, a native of Japan and China, by cutting the wood into billets, and boiling it in water, in iron pots, covered with earthenware heads, filled with straw. But camphor is also obtained from many other plants, as we have seen when treating of the Labiatae; and the finest of all the varieties of that article is produced by *Dryobalanops camphora*—(see page 126). The wood of the camphor tree is used to make chests, and its powerful odour protects the contents from the ravages of white ants, and other insects. Camphor is well known as a valuable stimulant in typhoid fevers; in large doses it is narcotic, and it is also much used in external applications.

The fruit of *Persea gratissima*, is called, in the West Indies, *Alligator Pear*, or *Avocado Pear*. The tree grows to the size of one of our largest apple trees. The fruit, in size and shape, is like a large pear, and is held in esteem in the West Indies; the pulp is of a pretty firm consistence, and has a delicate, rich flavour, which gains favour with those who do not like it at first; but it is so rich and mild that most people make use of some spice or pungent substance to give it poignancy, and for this purpose some make use of wine, some of sugar, others of lime juice, but most of pepper and salt. *Brazilian Nutmegs* are the fruit of *Cryptocarya moschata*, and what are called *Clove Nutmegs*, or *Ravensara Nuts*, are the produce of *Agathophyllum aromaticum*, a tree growing in Madagascar, both the fruit and leaves of which have the flavour of cloves. The inner bark and rind of the calyx of *Mespilodaphne pretiosa* are very fragrant, resembling cinnamon and bergamot. The leaves of *Caryodaphne densiflora*, a native of Java, are gratefully aromatic, and are used in infusion like tea, against spasms of the bowels, and in puerperal convulsions. *Nectandra cymbarum*, or *Orinocco sassafras*, is a tree a hundred feet high, and its bark is aromatic, bitter, and stomachic. The bark of *N. cinnamoides* resembles cinnamon. *Pitchurim Beans* are the seed-lobes of *N. puchury*, which grows on the banks of the Rio Negro. They are considered febrifuge and astringent, and the oil is said to be converted into a pleasant substitute for chocolate. The oily seed-lobes of *Aydedron enjumary* are equally esteemed with the preceding, for weakness of the digestive organs, and diseases of the intestines. *N. Rodiei*, a native of British Guiana, furnishes the *Bebeeru*

Bark, which has of late obtained a high reputation as a powerful tonic and febrifuge. The fruit is as large as a small apple, and both it and the bark are intensely bitter. They contain two alkaline principles, called *bebeerin*, and *sipeerin*. The *Clove Cassia* of Brazil is the bark of *Dicypellium caryophyllatum*. The wood of *Licaria guanensis* is yellowish, and has the odour of roses, and is called *Sassafras* by the natives. The cinnamon of the Isle of France is the bark of *Oreodaphne cupularis*. The wood of *O. exaltata* is yellow, very hard and durable, and is called *Sweetwood*, in Jamaica. *O. opifera* yields, by infusion of the bark, a volatile oil, smelling of orange-peel and rosemary, and used as a liniment; and it deposits a great quantity of camphor. *Til-wood*, produced by *G. fœtens*, a native of the Canaries, has a most disagreeable odour, and the wood of *O. bullata*, a native of the Cape of Good Hope, also smells most disagreeably, and hence it is called *Stinkwood* in the colony. This is hard, very durable, takes an excellent polish, and resembles walnut. It has been used in shipbuilding.

Sassafras is the bark of the root of *Sassafras officinale*, a native of North America, where, in the Southern States, it acquires the height of thirty to fifty feet, but in the North does not exceed the dimensions of a large shrub. The bark has an agreeable fragrance, resembling that of fennel, and the taste is sweet and aromatic. Its virtues seem to reside in a volatile oil, which may be obtained by distillation; besides which it contains camphorous and fatty matter, resin, wax, a peculiar principle resembling tannic acid, called *Sassafrin*, tannic acid, gum, albumen, starch, red colouring matter, lignin, and salts. It is stimulant, diaphoretic, and useful in chronic rheumatism, and cutaneous eruptions. The leaves contain so much mucilage that they are used for thickening soup. *Benzoin odoriferum* is a pretty large shrub, growing in the United States, the small branches of which are sometimes used as a gently stimulating aromatic, in the form of infusion or decoction, also as a popular vermifuge, and as an agreeable drink in low fevers. The berries, dried and powdered, were used during the revolutionary war, for allspice. *B. Neesianum*, a native of Nepal, is used for the same purpose. Benzoin has been applied to this genus from its strong smell of that drug, but must not be mistaken for the source of that article. The fruit of *Tetranthera Roxburghii* is black, of the size of a pea, and yields a greasy concrete oil, used for making candles by the Chinese, and also for ointments. The leaves and branches contain a great deal of mucilage, which is communicated to water by bruising them. The wood is the *mueda lukree* of the Indian druggists, and a favourite application to wounds and bruises. It is somewhat fragrant, slightly balsamic, and sweet.

The *Laurel*, or *Sweet Bay* (*Laurus nobilis*), is a shrub, common in shrubberies in this country, but it is a native of the shores of the Mediterranean. The leaves have an agreeable odour, a bitter aromatic taste, and are used in confectionery, for flavouring custards, blanchmanges, &c. The berries are black, and contain the same odour and taste as the leaves, and both yield an essential oil by distillation. But they contain also a fixed oil, which is separated by expression or decoction. The leaves, berries, and oil are exciting and narcotic. The title of *Bacca-laureatus*, or *Bachelor*, applied to university degrees, refers to the ancient custom of crowning the successful candidate for honours with a chaplet of laurel leaves and berries.

ORDER CLXIII.—PROTEACEÆ.—PROTEA FAMILY.

SHRUBS or Trees. Leaves alternate, sometimes almost whorled or imbricated. *Flowers* generally hermaphrodite, rarely unisexual, arranged in spikes or cone-like heads, which proceed from the axils of the leaves. *Perianth* simple, coloured, tubular, four-cleft. *Stamens* four, almost sessile, opposite the lobes of the perianth, and alternate, with four hypogynous glands or scales. *Ovary* free; consisting of one carpel, containing one or many ovules attached half way up its sides. *Style* terminated by a generally simple stigma. *Fruit* variously formed capsules, one-celled, and one or many seeded, opening on one side by a longitudinal suture, a number of which collected together form a sort of cone; sometimes unopening. *Seed* ascending, inverted or half inverted, sometimes winged. *Embryo* straight, without albumen, and an inferior radicle next the hilum.

Fig. 189. *Grevillea lavendulacea*.

I.—FRUIT, NUT-LIKE.

TRIBE 1. *Proteæ*.—Anthers free, inserted in the summit of the segment of the perianth. Ovary one-ovuled. Fruit a nut or samara. Flowers in heads.

GENERA AND SYNONYMES.

<i>Aulax</i> , Berg.	<i>Petrophila</i> , R. Br.	<i>Pleuranthe</i> , Sal.	<i>Nivenia</i> , R. Br.
<i>Leucadendron</i> , Hrm	<i>Isopogon</i> , R. Br.	<i>Leucospermum</i> ,	<i>Paranomus</i> , Sal.
<i>Conocarpus</i> , Ad.	<i>Atylus</i> , Sal.	[R. Br.	<i>Sarcocephalus</i> , R. Br.
<i>Euryspermum</i> ,	<i>Faurea</i> , Harvey.	<i>Mimetes</i> , Sal.	<i>Soranthe</i> , Sal.
[Sal.	<i>Protea</i> , L.	<i>Orothamnus</i> , Pape	<i>Spatalla</i> , al.
<i>Gissonia</i> , Sal.	<i>Leucadendron</i> , L.	<i>Serruria</i> , Sal.	<i>Adenanthos</i> Lab.
<i>Chasme</i> , Sal.	<i>Erodendrum</i> , Sal.	<i>Serraria</i> , Bur.	

TRIBE 2. *Conospermeæ*.—Anthers at first united by their contiguous cells, and free of the perianth. Ovary one-ovuled. Fruit a nut. Flowers in spikes or heads.

GENERA AND SYNONYME.

Synaphea, *R. Br.* | Conospermum. | Stirlingia, *Endl.* | „, Simsia, *R. Br.*

TRIBE 3. Franklandææ.—Anthers adnate to the tube of the perianth. Ovary one-ovuled. Fruit a nut. Flowers in a spike.

GENUS.

Franklandia, *R. Br.*

TRIBE 4. Persooniææ.—Stamens inserted at the base or in the middle of the segments of the perianth, sometimes hypogynous. Ovary two-ovuled. Fruit a nut, samara or drupe. Flowers in spikes.

GENERA AND SYNONYMES.

Symphionema, <i>R.Br.</i>	Pentadaetylon,	Faurea, <i>Hrv.</i>	Guevina, <i>Mol.</i>
Agastachys, <i>R. Br.</i>	[<i>Gürt.</i>	Andripetalum, <i>Sch.</i>	Quadria, <i>R. & P.</i>
Cenarrhænes, <i>Lab.</i>	Linkia, <i>Cav.</i>	Panopsis, <i>Sal.</i>	Nebu, <i>Feuill.</i>
? Potameia, <i>Thou.</i>	Brabejum, <i>L.</i>	Andreapetalum,	Bellendena, <i>R. Br.</i>
Persoonia, <i>Sm.</i>	Brabyia, <i>L.</i>	[<i>Pohl.</i>	

II.—FRUIT FOLLICULAR, OPENING.

TRIBE 5. Grevilleææ.—Follicle one-celled.

GENERA AND SYNONYMES.

* Ovary two to four ovuled.

Strangea, <i>Meisn.</i>	Manglesia, <i>Endl.</i>	Rhopala, <i>Schreb.</i>	Helicia, <i>Lour.</i>
Molloya, <i>Meisn.</i>	Hakea, <i>Schrad.</i>	Roupala, <i>Aub.</i>	Helitophyllum <i>Bl</i>
Fitchia, <i>Meisn.</i>	Conehium, <i>Sm.</i>	Leinkeria, <i>Scop.</i>	Castronia, <i>Non.</i>
Grevillea, <i>R. Br.</i>	Lambertia, <i>Sm.</i>	Dicknekeria,	Knightia, <i>R. Br.</i>
Lyssanthæ, <i>Sal.</i>	Xylomelum, <i>Sm.</i>	[<i>Fl. Fl.</i>	
Stylurus, <i>Sal.</i>	Orites, <i>R. Br.</i>	Adenostaphanes,	
Anadina, <i>R. Br.</i>	Oritina, <i>R. Br.</i>	[<i>Klotz.</i>	

** Ovary many ovuled.

Embothrium, <i>Forst.</i>	Hylogyne, <i>Sal.</i>	Stenocarpus, <i>R.Br.</i>	„ Agnostus,
Oreocallis, <i>R. Br.</i>	Lomatia, <i>R. Br.</i>	Cybelc, <i>Sal.</i>	[<i>A. Cunn.</i>
Telopia, <i>R. Br.</i>	Tricondylus, <i>Sal.</i>		

TRIBE 6. Banksiææ.—Follicle two-celled.

GENERA AND SYNONYMES.

Banksia, <i>L. f.</i>	Dryandra, <i>R. Br.</i>	Hemielidia, <i>R. Br.</i>
Isostylis, <i>R. Br.</i>	Josephia, <i>Sal.</i>	? Cylandria, <i>Lour.</i>

GEOGRAPHICAL DISTRIBUTION.—This family is found principally at the Cape of Good Hope and in Australia. A few are met with in South America and the Indian Archipelago, and one or two occur in Eastern Africa.

PROPERTIES AND USES.—None of this family are remarkable for their products. Those of Cape Colony and Australia are principally used for

firewood. The bark of many of them is astringent, and the fruit of some is eatable. The seeds of *Brabejum stellatum* are eaten like chesnuts, and used as a substitute for coffee by the Hottentots. The dried flowers of *Petrophila brevifolia* yield a yellow dye.

ORDER CLXIV.—PENÆACEÆ.—PENÆA FAMILY.

THIS small family is composed of evergreen shrubs, natives of the Cape of Good Hope, with opposite exstipulate leaves. *Flowers* hermaphrodite, regular. *Perianth* salver-shaped, four-lobed, with bracts at its base. *Stamens* four or eight, inserted on the perianth. *Ovary* superior, four-celled, with four half-indusiate stigmas. *Fruit* a four-celled capsule, either opening or unopening. *Seed* without albumen. *Embryo* with minute cotyledons.

GENERA AND SYNONYMES.

<i>Penæa</i> , L.	<i>Sarcocolla</i> , Kunth.	<i>Endonema</i> , Ad. Juss.
<i>Stylapterus</i> , Ad. Juss.	<i>Gischrocolla</i> , A. D. C.	<i>Geissoloma</i> , Lindl.
<i>Brachysiphon</i> , Ad. Juss.		

Penæa sarcocolla, a native of the Cape of Good Hope, and *P. mucronata*, a native of Ethiopia and Persia, both yield a gum-resinous substance of an agreeable smell, and a peculiar bitter, sweetish, and acrid taste. It is called *Sarcocolla*, and said to be purgative, but at the same time produces serious inconvenience by its acrid properties.



ORDER CLXV.—THYMELACEÆ—SPURGE-LAURELS.

SHRUBS, rarely herbs. *Leaves* simple, alternate, rarely opposite. *Flowers* sometimes unisexual by abortion, terminal, or axillary, in heads, spikes, or clusters. *Perianth* simple, coloured, and petal-like, more or less tubular, with four or five lobes, imbricate in æstivation, the two exterior the larger; throat naked, or bearded with perigynous glands or scales. *Stamens* either equal in number to the lobes of the perianth, and opposite them, or double that number, arranged in two series, and generally sessile, seldom two; anthers two-celled, bursting lengthwise. *Ovary* free, one or two-celled, frequently girded at the base by a fleshy disk, containing one solitary, pendulous, inverted ovule. *Style* generally lateral, terminated by a simple stigma. *Fruit* a sort of nut, slightly fleshy externally, and drupe-like, one-soeded. *Seed* with thin, fleshy albumen, which is sometimes wanting. *Embryo* straight, with plano-convex seed-lobes.

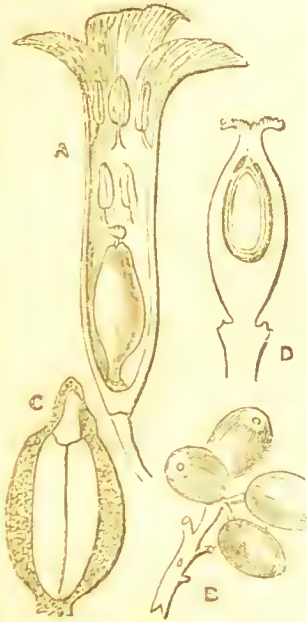


Fig. 190. A, Section of flower of *Daphne laureola*; B, fruit; C, section of seed, with the embryo; D, section of the ovary of *D. mezereum*.

TRIBE 1. Thymeleæ.—Ovary one-celled, containing one, very rarely two or three ovules, pendulous from the summit of the style-bearing side of the cell.

SUB-TRIBE 1. DAPHNIDÆ.—*Throat of the perianth naked.*

GENERA AND SYNONYMES.

* *Stamens one half fewer than the lobes of the perianth.*

<i>Pimelea</i> , Banks.	„ <i>Thecanthes</i> , Wik.	„ <i>Heterolana</i> , F. & M.
<i>Banksia</i> , Forst.	„ <i>Calypstrostea</i> , C. A. M.	<i>Gymnococca</i> , F. & M.
<i>Cookia</i> , Gmel.		<i>Macrostea</i> , Turcz.

** *Stamens equal in number to the lobes of the perianth.*

<i>Drapetes</i> , Lam.	„ <i>Candjera</i> , Decaisne.
? <i>Cansjera</i> , Juss.	<i>Schœnobiblus</i> , M. & Z.

* * *Stamens double the number of the lobes of the perianth.*

<i>Daphnopsis</i> , M. & Z.	<i>Nordmannia</i> , F.	<i>Funifera</i> , Landr.	<i>Lagetta</i> , Juss.
<i>Hargasseria</i> , Sch	[& M]	<i>Neesia</i> , Mart.	<i>Diron</i> , L.
[& D.]	<i>Ovidia</i> , Meisn.	<i>Boscia</i> , Vell.	<i>Goodalia</i> , Benth.

Lasiadenia, <i>Benth.</i>	Thymelæa, <i>T.</i>	Coleophora, <i>Miers.</i>	Piptochlamys,
Peddica, <i>Harv.</i>	Scopolia, <i>L.</i>	Stellera, <i>Gmel.</i>	[<i>Meisn.</i>
Cyathodiscus,	Eriosolena, <i>Bl.</i>	Chamaejasme,	Chlamydanthus,
[<i>Hochst.</i>	Roumea, <i>Wall.</i>	[<i>Amm.</i>	[<i>Meisn.</i>
Psilosolena, <i>Prl.</i>	Edgeworthia, <i>Mesn.</i>	Thymelæa, <i>T.</i>	Diarthron, <i>Trez.</i>
Harveya, <i>Plant.</i>	Wikstrœmia, <i>Endl.</i>	Lygia, <i>Fasano.</i>	Arthrosolen, <i>C.A.M</i>
Dais, <i>L.</i>	Capura, <i>L.</i>	Stellera, <i>Gärt.</i>	Passerina, <i>L.</i>
Daphne, <i>L.</i>	Diploniomorpha, <i>Msn</i>		Chymococœa, <i>Meisn.</i>

SUB-TRIBE 2. GNIDIEÆ.—*Throat of the perianth bearded with perigynous scales or glands.*

GENERA AND SYNONYME.

* *Stamens equal in number to the lobes of the perianth.*

Kelleria, <i>Endl.</i>	Struthiola, <i>L.</i>
Daphnobyron, <i>Meisn.</i>	Belvala, <i>Ad.</i>

** *Stamens double the number of the lobes of the perianth.*

Cryptadenia, <i>Meisn.</i>	„ Struthia, <i>Royon.</i>	Epichroxantha,	Dieranolepis, <i>Planch</i>
Lachnara, <i>Royon.</i>	Dessenia, <i>Ad.</i>	[<i>E. & Z.</i>	Linostoma, <i>Wall.</i>
Radojitskya,	Neetandra, <i>Berg.</i>	Calysericos, <i>E. & Z.</i>	Neetandra, <i>Roxb.</i>
[<i>Turcz.</i>	Thymelina, <i>Hoffm</i>	Lasiosiphon, <i>Fres.</i>	Lophostoma, <i>Meisn.</i>
Gnidia, <i>L.</i>	Canalia, <i>P. V. S.</i>	Enkleia, <i>Griff.</i>	

TRIBE 2. Aquilariæ.—Ovary either two-celled, with one-ovuled cells, or one-celled, with three parietal ovule-bearers, each bearing one ovule.

SUB-TRIBE 1. GYRINOPIDÆ.—*Throat of the perianth furnished with various perigynous scales. Stamens alternate, free. Flowers hermaphrodite.*

GENERA AND SYNONYMES.

Aquilaria, <i>Lam.</i>	Agallochum, <i>Rumph.</i>	Gyrinopsis, <i>Dene.</i>
Opiospermum, <i>Lour.</i>	Gyrinops, <i>Gärt.</i>	Leucosmia, <i>Benth.</i>

SUB-TRIBE 2. DRYMISPERMIDÆ.—*Throat of the perianth naked. Flowers hermaphrodite.*

GENERA AND SYNONYME.

Pseudais, <i>Decaisne.</i>
Drymispermum, <i>Reinw.</i>
Phaleria, <i>Jack.</i>

GEOGRAPHICAL DISTRIBUTION.—The greatest number of this family is found in the warmer parts of the southern hemisphere, beyond the tropics, particularly at the Cape of Good Hope, and in Australia. Some are natives of Europe, some of Asia, and a few of America. The Aquilariæ all inhabit the tropical parts of Asia.

PROPERTIES AND USES.—These are all more or less active. Their barks are composed of a fibrous, silky tissue, and are acrid and caustic; applied to the skin they produce blisters; chewed they cause a painful heat in the mouth; and, taken internally, they act as drastics, causing inflammation of the stomach; they become a true poison, and cause vomiting and purging when

taken in sufficient quantities. The fruit are acrid and drastic, but are eaten by birds. Some of the plants yield colouring matter. Many of them are cultivated in gardens and greenhouses, for the beauty and fragrance of their flowers.

The two species which possess the most active properties of the family are *Daphne mezereum*, and *D. gnidium*. The former is a native of Britain, and is what is known in gardens under the name of *Mezereon*, its spikes of beautiful fragrant flowers, which appear before the leaves in spring, adorning and perfuming many a cottage garden in England. The berries have an acrid, peppery taste, and are called wild pepper in Siberia. The women and exquisites of that country rub their cheeks with them, or mix the juice with water to wash with, and give to them a colour. Falks has seen the Tartar women use them in the same way. In those countries gargles are made of the berries, as a remedy in mucous sore throat; and Pallas states that the Russian peasantry take thirty of them as a purgative; they give them also to children affected with whooping-cough, to cause them to vomit; but eight or ten of the berries are sufficient to cause purging in any ordinary constitution. The bark, both of the stem and the root, is used in medicine, but that of the root is the more powerful. A small piece, moistened with vinegar, applied to the skin, and renewed twice a day, will soon produce a blister. Taken internally it is stimulant, having a tendency towards the skin and the kidneys. In large doses it excites purging, nausea, and vomiting; and in over doses it produces all the effects of acrid, narcotic poisons. It has some reputation as an alterative, in chronic rheumatism, and chronic diseases of the skin. In Siberia the root of mezereon is applied to swelling in the feet of horses, and to filling the aching teeth in men. The properties of *D. gnidium* is the same as that of mezereon, and it furnishes a yellow dye, which can be changed to green, by adding woad. In France the bark is employed in making a depilatory and caustic ointment, called *pommade à garou*. *D. alpina*, *eneorum*, *laureola*, (*Spurge Laurel*), *thymelea*, *pontica*, and indeed all the species have the same virtues, in a greater or less degree. It is from *D. cannabina* that *Nepaul paper* is made. The bark is first boiled in a metallic pot, with oak ashes, and the softened bark is then pounded to a pulp in a stone mortar. This pulp is churned with water into a very thin paste, till no fibre is left, and in this state is poured through a coarse sieve, placed over a frame with a cloth bottom. The sieve stops the coarse pieces, and allows the emulsion to pass through, and deposits the film over the cloth. The paper is subsequently polished by friction, with a shell or a piece of hard wood. The inner bark of *Lagetta lintearia*, or *Lace-bark Tree*, has all the appearance of coarse lace. The bark of *Dorca palustris* is acrid and cathartic, and the fruit is narcotic, like stramonium. The family contains a peculiar principle, called *daphnin*, discovered by Vauquelin in the bark of *D. alpina*. It is in prismatic crystals, grouped together, colourless, transparent, without odour, and of a bitter, somewhat austere taste. But it is supposed that this is not the active principle of the family. Vauquelin thinks that the virtues reside in an essential oil, which, by time, becomes changed into resin, and it is probably to this that the bark owes its vesicatory properties.

Aquilaria ovata, called *Eaglewood*, furnishes one of the Lign-aloes. It is yellowish-white, of a sweet odour, and is burnt at festivals, and in

temples, as incense. *A. agallochum* is of the same description, and it is a popular belief in India, that the secretion of the fragrant principle of the wood is the effect of disease. Dr. Ainslie states, on the authority of Mr. Colebrooke, that it is not until the tree has been long cut down, and allowed to rot, that the wood acquires its proper fragrance, to hasten which it is for some time buried underground; on being dug up again, so much of it is selected as is dark and glossy, and sinks in water. It is considered a tonic stimulant, and is used in gout and rheumatism.

ORDER CLXVI.—ELEAGNACEÆ—OLEASTERS

THIS order is so nearly allied to Thymelacææ, that it may safely be incorporated with it; the only essential difference between them being an ascending ovule and an inferior radicle in the one, and a pendulous ovule and superior radicle in the other. Trees and shrubs, which are covered with a sort of scaly scurf; having alternate or opposite, exstipulate, solitary leaves, and unisexual, rarely hermaphrodite, flowers. The male flowers have a perianth, with two to four sepals, which are sometimes united, and three, four, or eight stamens. In the female and hermaphrodite, the perianth is tubular, with a fleshy disk. Ovary free, one-celled, with a single, ascending ovule. Fruit a crustaceous seed-nut, inclosed in the succulent perianth. Embryo straight; albumen thin and fleshy; radicle short, inferior; seed-lobes fleshy.

GENERA AND SYNONYME.

Hippophaë, L.
Shepherdia, Nutt.
Leptargyreia, Raf.

Conuleum, L. C. Rich.
Elæagnus, L.

The plants of this family are mostly found north of the equator, in both hemispheres. *Shepherdia argentea* is a native of the United States, and is called *Buffalo-berry*, *Rabbit-berry*, and *Beef-suet Tree*. The fruit grows in clusters, is about the size of a red currant, and always of a more or less acid taste. Some years ago it was attempted to cultivate the shrub, for the sake of the fruit, in Britain, but without success. *Hippophaë rhamnoides*, or *Sea Buckthorn*, is found wild in this country. Its bark is considered astringent; its berries, which are numerous, small, and red, have an acid taste, which is owing to the presence of malic acid. They are much eaten by the Tartars; and the fishermen on the Gulph of Bothnia prepare a rob from them, which imparts a grateful flavour to fresh fish; and they

form the principal food of pheasants about the Caucasus. Professor Santagala has discovered that the fruit contains a fatty matter, of narcotic properties, twelve grains of which, given to a moderate-sized dog, prostrated its strength in a few hours. This confirms the opinion of the inhabitants of Dauphiné, who have always regarded them as poisonous. *Eleagnus angustifolia*, or *Wild Olive*, grows in mountainous places, in the South and East of Europe. Its flowers are powerfully fragrant, and contain in their receptacle a great quantity of honey, which, being procured by distillation, is, in many parts of Southern Europe, esteemed as a remedy in malignant fevers. In the Levant the pulp of the fruit is eaten. *E. orientalis* has a fruit as large as a jujube, used in Persia for the dessert.

ORDER CLXVII.—HERNANDIACEÆ—HERNANDIA FAMILY.

THIS small family is distinguished from Thymelacææ by its polygamous flowers, girded by a calyx-like involucre, which contains the pistils; and the lobed and oily seed-lobes.

GENERA AND SYNONYME.

Inocarpus, *Forst.*
Aniotum, *Sol.*

| *Sarcostigma*, *W. & Arn.*
Hernandia, *Pl.*

These are trees inhabiting the tropics of Asia and America. The nuts of *Inocarpus edulis* are eaten in the islands of the Eastern Archipelago, and taste like chesnuts. A decoction of the bark is powerfully astringent, and employed in dysentery. *Hernandia sonora* is astringent in all its parts. It is a native of the East and West Indies. In the former, the fibrous roots are chewed, and, applied to wounds caused by the macassar poison, perform an effectual cure. In the West Indies it is called *Jack-in-a-box*, the wind playing upon the yellow, persistent calyx, which envelopes the large nuts, and causing a whistling sound that alarms unwary travellers. The juice of the leaves is a powerful depilatory, and destroys the hair, wherever it is applied, without pain. The fruit is purgative, and in the West Indies a table drink is prepared from them. The wood of *H. guianensis* is very light, readily takes fire by the use of flint and steel, and is therefore used as amadou.

ORDER CLXVIII.—ULMACEÆ—ELMS.

TREES or shrubs. *Leaves* alternate, with two distinct deciduous leaflets at their base. *Flowers* hermaphrodite, sometimes unisexual by abortion, small, in loose clusters, never in catkins. *Perianth* with five, rarely four to eight lobes, bell-shaped. *Stamens* equal in number to the lobes of the perianth, inserted at its base and opposite its lobes. *Ovary* free, one or two-celled, each containing one pendulous, inverted, or half-inverted ovule. *Styles* two, broad, and bearing the stigmas on their inner surface. *Fruit* one or two-celled, dry, nut-like, or compressed, unopening, and girdled in all its circumference with a winged membrane. *Seed* solitary, pendulous. *Embryo* without albumen, or with very little, straight or curved, with leafy seed-lobes and a superior radicle.

TRIBE 1. *Celtææ*.—Ovary one-celled; ovules half inverted.

GENERA.

<i>Celtis</i> , <i>T.</i>	<i>Martensia</i> , <i>H. B. K.</i>
<i>Sponia</i> , <i>Comm.</i>	<i>Parasponia</i> , <i>Miq.</i>
<i>Solenostigma</i> , <i>Endl.</i>	

Fig. 191. A, Flower of *Ulmus fulva*; B, section of the pistil; C, fruit with the cell laid open; D, the embryo.

TRIBE 2. *Ulmææ*.—Ovary two-celled; ovules inverted.

GENERA AND SYNONYME.

<i>Planera</i> , <i>Gmel.</i>	<i>Euptalca</i> , <i>Zucc.</i>
<i>Abelicia</i> , <i>Belli.</i>	<i>Microptelea</i> , <i>Spach.</i>
<i>Zelcova</i> , <i>Spach.</i>	<i>Ulmus</i> , <i>L.</i>

GEOGRAPHICAL DISTRIBUTION.—These all inhabit the temperate regions of the northern hemisphere, both of the Old and the New World.

PROPERTIES AND USES.—*Celtis australis*, or *European Nettle-Tree*, is a native of the south of Europe and north of Africa, where it forms one of the largest timber trees. The timber is exceedingly durable, and was formerly employed by British coachmakers for making the frames of their vehicles, and by the Italian musical instrument-makers for making flutes and pipes. The leaves have the reputation of being astringent, and, being boiled, the decoction is used against dysentery and blenorrhœa. The fruit is sweetish, and the kernel yields a useful oil. The fruit of *C. occidentalis*, called *Sugar Berry*, are used in the United States against dysentery. The wood of *Planera Richardi*, or *Zelkova Tree*, when cut obliquely, resembles that of the Robinia, and presents, like it, numerous interlacements of fibres. It is very heavy, and, when dry, becomes so extremely hard, that it is difficult to drive nails into it with a hammer. In Asia Minor and about the shores of the Caspian, where it is abundant, it is employed for the same purposes as oak; and it is found to be even superior to that wood for furni-

ture. Its colour is agreeable; it is finely veined; and its texture is so compact, and its grain so fine, as to render it susceptible of the highest polish.

The inner bark of the *English Elm* (*Ulmus campestris*) is very mucilaginous, with a somewhat bitter and slightly astringent taste, containing a great deal of starch. It is considered tonic, astringent, and diuretic, and has been recommended in cutaneous diseases of a leprous character, as ringworm, applied both externally and internally. The wood is said to be sudorific; but its great value is in its usefulness as a hard and tough timber of close texture and clear grain. It is less liable to split than almost any other timber, and powerfully resists the decomposing action of water; it is therefore much in request for keels of ships, naves of carriage-wheels, mill-wheels, foundation-piles, and wet-planking. The large, warted knots with which the trunk is frequently covered makes beautiful pieces of cabinet and turnery ware. In Persia, Italy, and the south of France, galls are frequently produced on the leaves, sometimes the size of a fist, containing a clear water called *eau d'orme*, which is sweet and viscid, and is recommended to wash wounds, contusions, and sore eyes. Towards autumn these productions dry, the insects in them die, and there is found a residuc in the form of a yellow or blackish balsam, called *beaume d'ormeau*, which is recommended for diseases of the chest, according to Gmelin. *U. fulva*, a native of the United States, has the same medicinal virtues as the preceding, but in a much more active and powerful degree. Containing a great deal of mucilage, it is an excellent demulcent, and is especially recommended in dysentery, diarrhœa, and diseases of the urinary passages. The mucilage is highly nutritious, and there are instances on record of life being supported for a length of time by it alone. *U. montana* is what is called the *Scotch* or *Wyeh Elm*, a beautiful tree both in its form and foliage. Its timber is used for the same purposes as that of the English Elm, and particularly in waggon-work, coach-building, ship-building, and cabinet-work. On the leaves of *U. chinensis* a number of galls are produced, which are used by the Chinese for tanning leather and dyeing.

A peculiar vegetable principle called *ulmin*, or *ulmic acid*, was first discovered in the matter which spontaneously exudes from the bark of the English Elm. It is a dark-brown, almost black substance, without smell or taste, insoluble in cold, sparingly soluble in boiling water, which it colours yellowish brown; soluble in alcohol, and readily dissolved by alkaline solutions.

ORDER CLXIX.—SAMYDACEÆ—SAMYDA FAMILY.

THESE are trees and shrubs, principally natives of tropical America; a few are found in Asia and Africa. They have alternate, usually dotted leaves, with leaflets at their base. *Perianth* four or five-parted, with an imbricate, rarely valvate æstivation. *Stamens* inserted in the tube, and two, three, or four times as numerous as the lobes of the perianth. *Ovary* free, composed of three to five carpels, one-celled, with parietal ovule-bearers alternate with the sutures. *Fruit* a leathery, one-celled, three to five-valved capsule. *Seeds* albuminous.

GENERA AND SYNONYMES.

Samyda, <i>L.</i>	„ Langleia, <i>Scop.</i>	Melistaureum,	Candelabria, <i>Hochst.</i>
Guidonia, <i>Pl.</i>	Athenava, <i>Schreb.</i>	[<i>Forst.</i>	? Periclistia, <i>Benth.</i>
Cascaria, <i>Jacq.</i>	Bedousia, <i>Denn.</i>	Crateria, <i>Pers.</i>	Stephanopodium,
Antigona, <i>Fl. Fl.</i>	Anavinga, <i>Gärt.</i>	Lindleya, <i>Kunth.</i>	[<i>Pöpp.</i>
Iroucana, <i>Aub.</i>		Eucerea, <i>Mart.</i>	

They are all moderately astringent. The leaves of *Cascaria ulmifolia* are considered vulnerary in Brazil, and a decoction of those of *C. lingua* are used in inflammatory diseases and malignant fevers. *C. anavinga* is bitter in all its parts; the leaves are used in medicated baths, and the pulp of the fruit is powerfully diuretic. The root of *C. esculenta* is purgative, and the leaves are eatable.



ORDER CLXX.—TERMINALIACEÆ—MYROBALANS.

HERBS or shrubs. *Leaves* alternate or opposite, without leaflets at their base. *Flowers* hermaphrodite, sometimes unisexual by abortion, axillary or terminal. *Perianth* adhering to the ovary, from four to ten-lobed, and sometimes with the lobes arranged in two series. *Stamens* inserted in the tube of the perianth; *anthers* turned inwards, two-celled, either opening by a valve from the base to the apex or bursting longitudinally. *Ovary* inferior, one-celled, containing one, two, or four, rarely five ovules, pendulous from the top of the ovary. *Fruit* a drupe, sometimes accompanied with the persistent and enlarged perianth. *Seed* inverted, pendulous. *Embryo* without albumen, straight, with spirally convolute seed-lobes and a superior radicle.

TRIBE 1. *Terminaliææ*.—Perianth five-lobed. Anthers bursting longitudinally. Ovary with two, four, or rarely five ovules.

GENERA AND SYNONYMS.

<i>Bucida</i> , L.	<i>Getonia</i> , Roxb.
<i>Buceras</i> , P. Br.	<i>Calycopteris</i> , Lam.
<i>Hudsonia</i> , Rob.	<i>Chuncoa</i> , Pav.
<i>Terminalia</i> , L.	<i>Gimbernatia</i> , R. & P.
<i>Tanibouca</i> , Aub.	<i>Ramatuellea</i> , H. B. K.
<i>Adamarum</i> , Ad.	<i>Conocarpus</i> , Gärt.
<i>Bademia</i> , Gärt.	<i>Rudbeckia</i> , Ad.
<i>Patrea</i> , Thouars.	<i>Anogeissus</i> , Wall.
<i>Pentaptera</i> , Roxb.	<i>Andersonia</i> , Roxb.

Fig. 192. A, Fertile flower of *Terminalia catappa*; B, sterile ditto; C, section of fruit showing the seed; D, embryo; E, section of ditto.

TRIBE 2. *Gyrocarpeæ*.—Perianth with four to ten lobes, arranged in two series. Anthers opening by valves from below upwards. Ovary one-ovuled.

GENERA.

Gyrocarpus, Jacq.

| *Illigera*, Blume.

GEOGRAPHICAL DISTRIBUTION.—They are all natives of the tropics of Asia, Africa, and America.

PROPERTIES AND USES.—The whole family is distinguished for its astringent properties. The bark of *Bucida buceras* is used for tanning; and in the West Indies, that of *Coniocarpus racemosa*, and other species, as a substitute for cinchona bark. *Myrobalans* are the fruit of various species of *Terminalia*, and are of several varieties:—1. The *Belleric* is the fruit of *T. bellerica*, the size of a nutmeg and very astringent, with bitter kernels that are considered intoxicating. Dr. Ainslie considers the fruit astringent, tonic, and attenuant. The bark abounds in a gum like gum arabic, which

is soluble in water, and burns away in the flame of a candle. The kernel of the fruit yields an oil which encourages the growth of the hair. 2. *Chebulic* is the fruit of *T. chebula*, growing in the forests of India. This is very astringent, and, when dried, is about the size and shape of an olive. With catechu, it is applied with great advantage in aphthous ulcerations. The fruit, as well as the galls, is used by dyers to give a durable yellow colour with alum, and with ferruginous mud an excellent black. 3. *Citrine*, obtained from *T. citrina*, act as a gentle purgative, and are often made into a pickle. 4. *Indian* are merely the small unripe fruits of the preceding. These fruits were held in high reputation by the ancients, as laxative and astringent, in various complaints, particularly diarrhoea and dysentery; but their use is now discontinued. It is said that some of the fruit has been used as a substitute for galls in the preparation of ink-powder.

The roots of *Terminalia alata* are used in India as a febrifuge, and the powder, mixed with oil of sesamum, is employed in aphthous afflictions. The juice of the leaves is injected into the ears to cure earache. *T. argentea*, a native of Brazil, yields a resin similar to gamboge, which is purgative in the dose of half a scruple. *T. catappa*, a native of India and the Mauritius, produces a fruit three inches long and egg-shaped, the kernel of which has a flavour of almonds or filberts, and from which an oil is expressed equal to the best olive oil, that does not become rancid. They are used for tarts, and for pectoral emulsions. The Indians employ the juice of the leaves, mixed with rice water, to moderate cholic, the heat of the bile, and to allay headaches arising from bad digestion. The wood is white, hard, and useful for a variety of purposes; and the tree itself, on account of its beauty and the shade it yields, is planted about houses. *T. mauritiana* is a resinous tree growing in the Isle of Bourbon, and there called *False Benzoin*. It furnishes a sort of resin called gum benzoin, distinct from benzoin. Its bark is thick, covered with a yellow, resinous, and fragrant dust, which colours the saliva a greenish-yellow colour; it is of an astringent taste, and serves to tan the skins of the country where it grows; its decoction precipitates iron black, and it is employed in the island as an antisyphilitic and sudorific. The kernels of the fruit of *T. moluccana* are eatable, but do not yield any oil. *T. vernix* is one of the trees which furnishes the celebrated Chinese black lacquer. Its juice is said to be caustic, and its exhalations dangerous.

ORDER CLXXI.—NYSSACEÆ—TUPELOS.

THIS family is distinguished from Terminaliaceæ in being furnished with albumen, and in the seed-lobes not being spirally twisted; but is so nearly allied as, in my opinion, to be easily admissible as a tribe of that order. It is separated from Santalaceæ by the pendulous ovule.

GENUS AND SYNONYME.

Nyssa, Gronov.

Tupelo, Ad.

The trees composing this order are natives of the Southern States of North America. They are all large, attaining the height of eighty or a hundred feet, and producing fruit of the size of olives, with a brisk sub-acid taste. *Nyssa capitata*, is called *Sour Gum*, or *Ogeechee Lime*, from the fruit being used as Limes. *N. sylvatica* (*Black Gum*), and *N. aquatica* (*Tupelo*, or *Pepperidge*), along with the first produce timber so tenacious in the grain that it is very difficult to split; it is of little value.

ORDER CLXXII.—GRUBBIACEÆ—GRUBBIA FAMILY.

THIS order differs from Santalaceæ in the inflorescence, the flowers being arranged like those of the hop; in the stamens scarcely adhering to the base of the lobes of the perianth; in the form of the anthers, the cells of which open by a small reflexed valve; and in the ovary being two-celled, each cell containing a solitary inverted ovule, pendulous from the superior angle of the partition.

GENUS AND SYNONYMES.

Grubbia, Berg.
Ophira, Burm.
Strobilocarpus, Klotzsch.

The family is composed of but three species, all of which are natives of the Cape of Good Hope, none of which are known to possess any properties, or to yield any products.

ORDER CLXXIII.—HELWINGIACEÆ.—HELWINGIAS.

GREAT diversity of opinion exists as to the proper position of this family. Endlicher considers it in proximity to Bruniaceæ, and Decaisne places it near Hamamelidaceæ, while others refer it among the Amentaceous families. Till some satisfactory conclusion has been arrived at, I prefer placing it between Grubbiaceæ and Santalaceæ, with the former of which it agrees in its pendulous ovules, and with the latter in its apetalous unisexual flowers, inferior ovary, minute embryo in solid fleshy albumen, and superior radicle.

GENERA.

Helwingia, W.

There is but one species, *Helwingia rusciflora*, a native of the mountains of Japan, and the young leaves of which are used as an esculent vegetable. The flowers are produced on the leaves in the same way as those of our native Butcher's Broom.

ORDER CLXXIV.—SANTALACEÆ.—SANDAL-WOODS.

TREES, shrubs, or herbaceous plants. *Leaves* alternate, rarely opposite, entire, sometimes scale-like, of almost obsolete, and without stipules. *Flowers* hermaphrodite, very rarely unisexual by abortion; small, solitary, or arranged in spikes or racemes. *Perianth* adherent to the ovary, with four or five valvate lobes. *Stamens* four or five, opposite the segments of the perianth, and inserted in their base on short filaments; *anthers* opening longitudinally. *Ovary* inferior, one-celled, containing one, two, or four ovules, which hang from the summit, or inferior part of an ovule-bearer, rising up from the base of the cell. *Style* simple, terminated by a lobed stigma. *Fruit* unopening, one-seeded, hard, dry, and nut-like, or sometimes slightly fleshy. *Seed* solitary by abortion, inverted, with fleshy albumen. *Embryo* straight, in the axis of the albumen, with linear, or oblong seed-lobes, and a superior radicle.

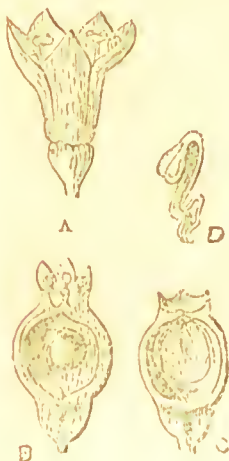


Fig. 193. A, Flower of *Thesium pratense*; B, section of ripe fruit; C, ditto of ripe fruit and seed; D, ovule-bearer and two ovules.

TRIBE 1. Buckleyæ.—Male flowers monochlamydeous, female dichlamydeous; those of the male similar to the interior lobes of the female. Ovules suspended from the summit of the ovule-bearer.

GENUS.

Buckleya, *Torrey*.

TRIBE 2. Santalæ.—Flowers always monochlamydeous, with the tube adherent to the ovary.

GENERA AND SYNONYMS.

* *Ovule-bearer slender, suspending the pendulous ovules from its summit.*

Quinchamalium, [<i>Mol.</i> Quinchamala, <i>W.</i> <i>Arjona</i> , <i>Cav.</i> <i>Myoschylos</i> , <i>R. & P.</i> <i>Pyrularia</i> , <i>Mich.</i> <i>Hamiltonia</i> , <i>Mhl.</i>	Sphaerocarya, [<i>Wall.</i> Scleropyrum, [<i>Arn.</i> <i>Henslowia</i> , <i>Bl.</i> <i>Dendotropis</i> <i>Miq</i> <i>Osyris</i> , <i>L.</i> <i>Casia</i> , <i>Cam.</i>	Colpoon, <i>Berg.</i> <i>Rhoiacarpus</i> , <i>A.D.C.</i> <i>Osyridicarpus</i> , <i>ADC</i> <i>Comandra</i> , <i>Nutt.</i> <i>Thesium</i> , <i>Rehb.</i> <i>Darbya</i> , <i>A. Gr.</i> <i>Thesium</i> , <i>L.</i> <i>Rhinostegia</i> , <i>Trec</i>	<i>Thesidium</i> , <i>Londer.</i> <i>Nanodea</i> , <i>Banks.</i> <i>Ballexerda</i> <i>Comm</i> <i>Choretum</i> , <i>R. Br.</i> <i>Leptomeria</i> , <i>R. Br.</i> <i>Omphacomeria</i> , <i>A.</i> [<i>D. C.</i>
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** *Ovule-bearer spindle-shaped, bearing the ovules near its base.*

Santalum, *L.*
Sirium, *L.*

„ *Fusanus*, *L.*
Mida, *A. Cunn.*

TRIBE 3. *Anthoboleæ*.—Flowers monoehlamydeous. Ovary adherent only at the base.

GENERA AND SYNONYME.

Anthobolus, *R. Br.*
Exocarpus, *Labill.*

| *Sarcocalyx*, *Zipp.*
? *Cervantesia*, *R. & P.*

'GEOGRAPHICAL DISTRIBUTION.—The species of this family are found in the temperate regions of both hemispheres, and in the tropics of Asia and Australia.

PROPERTIES AND USES.—The most valuable product of the family is Sandal, or Santal-wood. This is obtained from several species of *Santalum*. *White Sandal-wood* is derived from *Santalum album*, a tree growing in India, and in the islands of the South Pacific Ocean. The wood is very hard, heavy, and susceptible of a high polish; is almost inodorous, and its taste is slightly bitter. It is esteemed by the native physicians as refreshing and sedative, and is administered in remittent fevers and diseases of the urinary passages. The *Yellow*, or *Citron Sandal-wood*, is from *S. Freycinetianum*, a native of the Sandwich, Marquesas, and Feejee islands, and near the head of Spencer's Gulf, in Australia. This is the wood so highly esteemed in the East for its fine perfume and valuable timber. It is formed into all kinds of fancy furniture, boxes, fans, and other articles; that which is of a pale colour they burn in their temples, as incense, and private apartments; and use long, thin slips of the wood, inserted in a mixture of rice-paste and sawdust, as candles, which emit a pleasing fragrance. The delightful odour of the wood is due to the presence of an essential oil, heavier than water, readily congealed, and having a peculiar, sweet smell; it is employed by perfumers, both in Europe and India, for adulterating attar of roses. The powder of the wood, rubbed on the skin, allays the irritation occasioned by mosquito bites. *S. myrtifolium* produces the Sandal-wood of Malabar. The fruit of *S. acuminatum* is called by the Australians *Quandang Nut*, and is eaten like almonds; and that of *Cervantesia tomentosa* is used for the same purpose in Peru. The seeds of *Pyrularia pubera*, a native of the mountains of Virginia and Carolina, yield oil. *Leptomeria, Billardieri*, a native of Tasmania, is acid in all its parts, and, being chewed, allays thirst. An infusion of the leaves of *Myoschilos oblongus* is used by the Chilians as a purgative, and that of *Osyris nepalensis* by the Nepaulese as a substitute for tea.



ORDER CLXXV.—VISCACEÆ.—MISTLETOES.

SHRUBS, for the most part parasitical. *Leaves* simple, opposite, veinless, thick, leathery, and without stipules. *Flowers* unisexual, either in pairs, in spikes, or in panicles. *Perianth* adherent with the ovary, having three to five fleshy, triangular divisions, valvate in æstivation. *Stamens* equal in number to the divisions of the perianth, and opposite them. *Ovary* inferior, crowned with an annular disk, and with one cell, containing three inverted ovules, suspended from the point of a free-central ovule-bearer. *Style* sometimes wanting; *stigma* simple. *Fruit* fleshy, one-celled. *Seed* erect, solitary, adhering to the pulp, which is thick and viscons. *Embryo* with fleshy albumen, somewhat fleshy seed-lobes, and a superior radicle, which protrudes beyond the albumen.

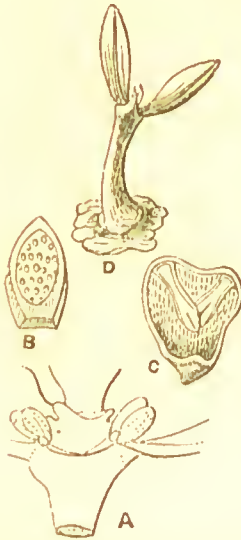


Fig. 194. A, Flowers of *Viscum album*; B, anther of ditto; C, section of seed, showing two embryos; D, a young plant.

GENERA AND SYNONYMS.

Viscum, T.
Areeuthobium, Bieb.
 Razoumowskya, Hoffm.
 ? *Castanea*, St. Hil.
Myzodendron, Sol.
Misodendron, DC.

Engelopogon, Pöpp.
Phoradendron, Nutt.
Allobium, Miers.
Eubrachion, Hook.
Lepidoceras, Hook.

GEOGRAPHICAL DISTRIBUTION. — These are found in Europe, Asia, and America, both in the temperate and tropical regions.

PROPERTIES AND USES. — The most familiar plant of the family is the Mistletoe (*Viscum album*), a native of England, growing abundantly on the apple tree in the orchards of the southern and western counties; it is also found on the hawthorn,

and occasionally on the oak, lime, elm, fir, willow, walnut, and pear, and several other trees. The mistletoe was held sacred by the Druids, who employed it in their sacrifices. They gathered it with great ceremony, clothed in white, and separating it from the oak with a golden knife, uttering at the same time ceremonial chants. The fresh bark and leaves have a peculiar disagreeable odour, and a nauseous, sweetish, slightly bitter taste. The leaves and wood were at one time highly esteemed as a remedy in epilepsy, palsy, and other nervous diseases. Birdlime is prepared from the berries, and the bark boiled in water, then beaten in a mortar and washed. The berries are eaten by several birds of the thrush kind, particularly by the mistle-thrush; and it is said that the plant is propagated, by the seed passing through them whole, and being deposited on the branches of trees. It is easily propagated, and those who are curious about such matters may do so by merely making a slanting incision in the bark of an apple tree, and inserting the seed; as the spring advances the seed will throw out a small radicle, which, coming in a curving direction, takes hold of the bark of the tree, and, taking root, will speedily be established.

ORDER CLXXVI.—ARISTOLOCHIACEÆ.—BIRTHWORTS.

HERBACEOUS plants or shrubs, often climbing. *Leaves* alternate, simple with or without leaflets at their base. *Flowers* hermaphrodite, solitary in the axils of the leaves, either brown or of some dull colour. *Perianth* coloured, either regular, with three valvate divisions, or irregular, tubular, and with six lobes, one of which is prolonged into a more or less elongated and sometimes very broad tongue; occasionally it is two-lipped, the upper lip being much smaller than the other. *Stamens* six, arising from the base of the perianth, and either distinct or united by their filaments into a small epigynous column. *Style* terminated by three or six radiating stigmas. *Ovary* inferior, with six, rarely three or four cells; ovules inverted, numerous, inserted in one or two series in the central

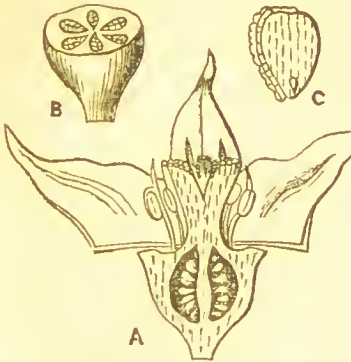


Fig 195. A, Section of the flower of *Asarum canadense*; B, ditto of the ovary; C, ditto of the seed, showing the embryo.

angle of the cells. *Fruit* either a capsule, or a berry with three, four, or six many-seeded cells. *Seeds* three, angular or round, with a very minute embryo, in the base of copious, fleshy, or somewhat horny albumen.

TRIBE 1. *Asareæ*.—Stamens distinct.

Asarum, T.

| *Heterotropa*, *Dcaisne*.

TRIBE 2. *Aristolochiæ*.—Stamens united into a column.

GENERA AND SYNONYMES.

<i>Aristolochia</i> , T.	<i>Siphonolochia</i> ,	<i>Munickia</i> , <i>Reichb.</i>	<i>Asiphonia</i> , <i>Griff.</i>
<i>Glossula</i> , <i>Raf.</i>	[<i>Reichb.</i>	<i>Apama</i> , <i>Lam.</i>	<i>Trichopodium</i> <i>Ludl</i>
<i>Serpentaria</i> , <i>Raf.</i>	<i>Bragantia</i> , <i>Lour.</i>	<i>Trimeriza</i> , <i>Lindl.</i>	<i>Trichopus</i> , <i>Gärtl.</i>
<i>Hocquartia</i> , <i>Dum</i>	<i>Ceramium</i> , <i>Bl.</i>	<i>Strakea</i> , <i>Presl.</i>	<i>Lobbia</i> , <i>Planchon.</i>
<i>Siphisia</i> , <i>Raf.</i>	<i>Vanhallia</i> , <i>Schll.</i>	<i>Thottea</i> , <i>Rottb.</i>	

GEOGRAPHICAL DISTRIBUTION.—The greatest number is found in tropics and temperate regions of North America. In tropical Asia they are rare, but on the shores of the Mediterranean they are more frequent. South of the tropics they are unknown.

PROPERTIES AND USES.—These possess tonic and astringent properties; and some of them are somewhat poisonous, or at least dangerous. *Asarabacca* (*Asarum europæum*) has long enjoyed a reputation as an emetic and purgative. The root has an acrid taste, with a smell resembling pepper;

reduced to powder and snuffed up the nose, it causes great irritation, and a copious flow of mucus. The leaves are slightly aromatic, bitter, acrid, and nauseous, and have been recommended in doses of three or four grains of the powder taken every night, for headache, chronic ophthalmia, and rheumatic and paralytic affections of the face, mouth, and throat. The whole herb was formerly considered highly diuretic and emmenagogue. The root has been found to contain an acrid, volatile principle, similar to that of arum; a volatile concrete oil analagous to camphor, called *asarone*; a very acrid, limpid, fixed oil; a yellow matter, nauseous, emetic, soluble in water, called *asarine*, of the same nature as cytisine; starch; ulmine; some salts, and a little silicate of iron. The plant is called *cabaret* in France, because it is said frequenters of public-houses use it to produce vomiting. *A. canadense*, called in America *Canada Snake-root*, *Wild Ginger*, or *Indian Ginger*, possesses stimulant, tonic, and diaphoretic properties; and not the purgative and emetic properties of the European species. The whole plant has a grateful aromatic odour, most powerful in the root, which has an aromatic, slightly bitter taste, resembling that of cardamom. The roots are used by the country people as a substitute for ginger.

The roots of all the species of *Aristolochia* are bitter, with tonic, stimulant, febrifuge, and emmenagogue properties; and many of them are used in America against the bites of poisonous serpents. The odour and virus of *A. anguicida* are so powerful as to drive serpents from their haunts. Jacquin states that a few drops of the juice introduced into the mouth of a serpent causes a sort of stupor, which enables it to be handled with impunity; should they swallow it, they die in agony; and applied to the recent bite of one of these reptiles, it infallibly heals it. This is supposed to be the *Guaco* of the Caraceas, celebrated as an antidote to snake poison by Humboldt and others; and it is by the influence of plants of this genus that the Egyptian jugglers are supposed to stupefy the snakes they play with. A decoction of the root of *A. bilobata* cures cutaneous diseases; and the root itself, introduced into the vagina, is said to cause the expulsion of the dead fetus. The Indian physicians employ the decoction of the dried leaves of *A. bracteata* as an anthelmintic, in the dose of two ounces twice a day. The fresh leaves, bruised with castor oil, are regarded as an excellent remedy against inveterate itch; and they purge infants, on being bruised and applied to the navel. The flowers of *A. cordiflora*, which grows on the bank of the river Magdalene, near Monpox, are so large that children put them on their head as they would bonnets. *A. fragrantissima* is a native of Peru, where it is called *Bejuco della estrella*, because of its twining growth, and of its root being cut horizontally, presenting the appearance of a star. The bark of this species has a camphorous odour, and a taste at first sweet, but soon becoming piquant and aromatic. It contains a resinous principle, empyreumatic oil, pyrolygneous acid, traces of gallic acid, a yellow colouring matter, extractive, and potassa. The Peruvians employ this bark in many diseases, but particularly in fevers, dysentery, rheumatic pains, gout, and the bites of serpents; it excites perspiration, and acts as an emmenagogue. *A. grandiflora*, a native of the West Indies, produces very large flowers, six inches round, the opening of which continues glued up for a considerable time. The flowers are very fetid, with a narcotic and ungrateful odour of vulvaria. The roots are bitter, with a

nauseous odour, and are said to be destructive to swine, and other animals that eat them; hence the plant is called *Poisonous Hog-weed*. *A. indica* has a nauseously bitter root, which is administered as an emmenagogue and in paroxysms of gout. It is considered by the native physicians of India to be a valuable remedy in the diarrhoea of children proceeding from dentition. Thunberg states that in Ceylon the root, infused in alcohol, is given as a stomachic and carminative.

Common Birthwort (*A. clematitis*), a native of England, possesses the same properties as those already noticed. The root is employed against rheumatism, and particularly as a remedy against gout it has been highly praised. The Russians eat the fruit raw, as a cure for intermittent fevers. This plant, however, requires to be administered in moderate doses, as it is acrid and active in its operation. M. Orfila destroyed dogs, by giving them five drachms at first, and nine drachms after one or two days; death was caused by producing a stupifying action on the nervous system, for only slight inflammation took place in the tissues of the stomach. *A. longa*, *A. rotunda*, and *A. pistlochica*, natives of Europe, possess the same properties. *A. serpentaria* is called in America *Virginian Snake-root*. It grows abundantly in the middle, southern, and western states, and its root is highly esteemed as a stimulating tonic, with diaphoretic and diuretic properties. It is highly commended in typhoid and intermittent fevers, is sometimes given in dyspepsia, and is employed as a gargle in malignant sore throat. The root has a strong aromatic and camphorous smell, and a warm, very bitter, and camphorous taste. It contains a volatile oil; a yellow, bitter principle, soluble in water and alcohol; resin; gum; starch; albumen; lignine and various salts. The yellow bitter principle is analogous to the bitter principle of quassia; and the volatile oil, on standing, deposits round the edges of its surface small crystals of camphor. *Bra-gantia tomentosa*, a native of Java, is intensely bitter, and, according to Horsfield, is employed in that country as an emmenagogue.



ORDER CLXXVII.—NEPENTHACEÆ—PITCHER PLANTS.

HERBACEOUS or half-shrubby plants; stems without concentric zones.

Leaves with the footstalks spread out like a leaf and prolonged in the form of a tendril, terminated by a pitcher, which is covered with a lid. *Flowers* dioecious, arranged in a panicle. *Perianth* deeply divided into four obtuse, coloured lobes. *Stamens* united into a central column, terminated by about sixteen anthers, which form a small spherical head, and which open outwards in two longitudinal cells. In the female flowers the *Ovary* is free, four-cornered, four-valved, four-celled, many-ovuled, and terminated by a sessile, disk-like stigma; central column wanting; *ovules* ascending, attached to the sides of the partitions, which are in the middle of the valves. *Fruit* a four-celled, and four-valved, many-seeded capsule. *Seeds* adhering to the sides of the partitions, ascending, very minute. *Embryo* straight in almost the whole length of the axis of fleshy albumen, with linear, plano-convex seed-lobes, and a short, inferior radicle directed towards the hilum.

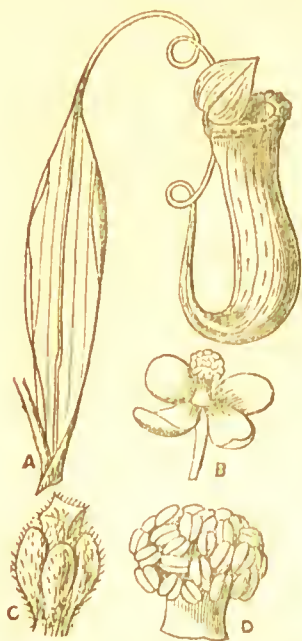


Fig. 196. A, Leaf of *Nepenthes distillatoria*; B, male flower; C, female ditto; D, head of anthers greatly magnified.

GENUS AND SYNONYMES.

Nepenthes, L.
Phyllamphora, Lour.
Pandura, Burm.

GEOGRAPHICAL DISTRIBUTION.—Indigenous to tropical Asia and Madagascar, inhabiting marshy places.

PROPERTIES AND USES.—That curious plant known as the *Pitcher Plant* (*Nepenthes distillatoria*) is a native of India, whence it was introduced by the celebrated Dr. Carey. It is remarkable for having the extremities of its leaves terminated by large, handsomely-formed pitchers closed by a lid, and filled with water. This water is a secretion of the plant, and not, as was once supposed, an accumulation of dew. It varies very much in quantity; in some instances there is not more than a drachm, and in others it fills about one-third of each pitcher. What the intention or use of this water is has not been ascertained, but, being sweet, it serves to attract and decoy a number of flies and other insects, which, when they once enter, seldom escape alive, their exit being intercepted by the reversed glands on the inside of the base of the pitcher acting like a rat-trap, and keeping them back till they are ultimately drowned in the water. This liquid was found to emit a smell of baked apples when boiled, from containing a trace of vegetable matter; and when evaporated to dryness, it yielded minute crystals of superoxalate of potash.

ORDER CLXXVIII.—BEGONIACEÆ.

HERBACEOUS and half-shrubby plants, with succulent stems and leaves, and an acid juice. *Leaves* alternate, simple, entire, or palmated, often oblique or unequal, furnished with lateral membranous leaflets at the base of their footstalks. *Flowers* unisexual, monœcous, disposed in forked panicles. *Perianth* in the male flowers with four coloured divisions, the two exterior being the largest; in the females it has four to nine divisions. *Stamens* numerous, united into a solid column terminated by the anthers, which form a spherical head, and burst outwards in two longitudinal cells. *Ovary* inferior, three-celled, with three large ovule-bearers meeting in the axis; globular, or furnished with three angles or wings; ovules inverted. *Styles* six, with thick, tortuous stigmas like those of the cucurbitaceæ. *Fruit* a three-celled capsule or berry, winged, many-seeded. *Seed* with a thin, transparent covering, longitudinally striated. *Embryo* straight, destitute of albumen, with very short seed-lobes, and a long, round, blunt radicle next the hilum.



Fig. 197. A, Male flower of *Begonia undulata*; B, a female ditto; C, ovary cut across.

GENERA.

Begonia, L.
Eupatium, Lindl.
Diploclinium, Lindl.

GEOGRAPHICAL DISTRIBUTION.—They all inhabit the tropics of Asia and America; none are found in Africa, but a few in the islands between Africa and Asia.

PROPERTIES AND USES.—The leaves of many of the species are acid, and eaten in some countries under the name of wild sorrel; they contain a sufficient quantity of oxalic acid as to render the extraction of it profitable in some parts where the plants abound. Their roots are bitter and astringent, and some of the Mexican species are drastic purgatives.

ORDER CLXXIX.—DATISCEÆ—DATISCA FAMILY.

A SMALL family allied to Begoniaceæ. Herbs or trees with alternate exstipitate leaves and unisexual flowers. *Perianth* with three or four divisions adherent to the ovary. *Stamens* three to seven. *Ovary* inferior,

one-celled, with three or four many-seeded, marginal seed-bearers. *Fruit* a one-celled capsule opening at the apex. *Seeds* with a reticulated covering. *Embryo* straight, without albumen, and a very long radicle turned towards the hilum.

GENERA AND SYNONYME.

Datisca, L.
Tetrameles, R. Br.

Anictoclea, Nimmo.
Tricerastris, Presl.

These are distributed over the whole of the temperate regions of the northern hemisphere. *Datisca cannabina* is a native of Crete, and much resembles hemp in its habit of growth. It contains a great abundance of bitter principle, and possesses very marked tonic properties. In the island of Crete it is employed as a substitute for cinchona, and is said to act with almost as great efficacy. A kind of starch has been extracted from its roots analogous to inuline; it is called *datiscine*, and serves to dye a yellow colour.



Begonia Ingramii.

ORDER CLXXX.—EMPETRACEÆ.—CROWBERRIES.

SMALL heath-like shrubs. *Leaves* evergreen, alternate, or in whorls,



Fig. 193. A, Male flower of *Ceratiola erieoides*; B, female ditto; C, section of the ovary; D, a berry; E, section of a nut; F, section of seed, showing embryo.

without leaflets at their base. *Flowers* small, hermaphrodite, or unisexual, either united or solitary in the axils of the leaves. *Perianth* free, with two or three distinct divisions, the interior of which are sometimes petal-like, and in *Pakesia* they are united. *Stamens* equal in number to the lobes of the perianth, alternate with them, and inserted in the disk; *anthers* turned outwards, two-celled, bursting longitudinally. *Ovary* free, seated on the disk, two, three, six, or nine-celled, each cell containing one solitary inverted ovule, ascending from the angle at the base of a very slender central column. *Style* short, surmounted by a stigma, radiating in lobes equal in number to the cells of the ovary. *Fruit* a berry, enveloped by the persistent perianth, and containing two, three, six, or nine bony nuts, which are one-seeded, and either distinct or cohere at the axis. *Seeds* solitary, ascending. *Embryo* taper, axile, and almost as

long as the dense, fleshy albumen; seed-lobes semi-cylindrical, short; radicle inferior, next the hilum.

GENERA AND SYNONYME.

Empetrum, L.
Corema, Don.
Ceratiola, Michx.

Pakesia, Tuckerm.
Tuckermannia, Klotz.

GEOGRAPHICAL DISTRIBUTION.—These are found in the northern parts, and in the Alpine districts of Central Europe, in North America, and at the Straits of Magellan.

PROPERTIES AND USES.—The leaves and fruit are acid. The *Crowberry*, or *Crakeberry* (*Empetrum nigrum*), grows abundantly on the Highland hills of Scotland, and in mountainous parts of Derbyshire and Staffordshire. Their small black berries afford food for the heathcock, and are

also sometimes eaten by the Highlanders and children, but if taken in large quantities they produce headache. They have an agreeable, acidulous taste, and are employed in Siberia in making a refreshing drink. Boiled with alum they afford a dark, purple colour, and the Kamtschadales use them for dyeing skins and cloth, and for making ink. The white berries of *Corema* are employed by the Portuguese in making an acidulous drink.

ORDER CLXXXI.—CALLITRICHACEÆ.—STARWORTS.

THESE are aquatic herbs, with minute axillary, bracteate, unisexual, and naked flowers. Stamen one, rarely two; anther kidney-shaped, one-celled. Ovary solitary, four-sided, four-celled, each cell containing one half-inverted ovule suspended from the axis; styles two. Fruit four-celled, four-seeded, unopening. Seeds peltate. Embryo in the axis of fleshy albumen, with a very long, curved, superior radicle, and very short seed-lobes.

GENUS.

Callitriche, L.

This consist of only one genus, which inhabits still waters of Europe and North America.

ORDER CLXXXII.—CERATOPHYLLACEÆ.—HORNWORTS.

THIS family, like the preceding, is composed entirely of aquatic herbs. The leaves are in whorls, and the flowers are unisexual. The perianth is ten to twelve-cleft, inferior. Anthers twelve to twenty, sessile, two-celled. Ovary superior, one-celled, with one pendulous ovule. Fruit a seed-nut. Seed pendulous, solitary, without albumen. Embryo with two seed-lobes, a many-leaved plumule, and an inferior radicle.

GENUS.

Ceratophyllum, L.

They are found in ditches in various parts of the world, but they have no properties.

ORDER CLXXXIII.—EUPHORBIACEÆ—SPURGES.

HERBS, shrubs, or very large trees, almost all containing an acrid and

suspicious milky juice. *Leaves* generally alternate, rarely opposite, and with or without leaflets at their base. *Flowers* unisexual, generally very small, and presenting very varied forms of structure and arrangement, some having both a calyx and corolla, others with a perianth only. Calyx inferior, with three, four, or six deep divisions furnished internally with scales and glands. *Corolla*, when present, with petals which are sometimes distinct, and sometimes united, appearing to be formed of abortive and sterile stamens. *Stamens* definite or indefinite, either free or united; *anthers* two-celled, sometimes opening by pores. *Ovary* free, sessile, or stalked, sometimes accompanied with a hypogynous disk; one, two, three, or more celled, but generally with three, each containing one or two ovules suspended from their inner angle. *Styles* equal in number to the cells; *stigmas* either compound or simple, with several lobes. *Fruit* dry, or somewhat fleshy, composed of three nuts or carpels, which are bony internally, containing one or two seeds, and opening by their internal angle in two valves with elasticity; sometimes they are fleshy and unopening; they rest by their internal angle on a central column, which often remains after they are dispersed. *Seeds* solitary or twin, suspended, sometimes with an



Fig. 199. A, *Euphorbia corollata*; B, section of an involucre, showing the male flowers surrounding the female, which is raised on a slender stem; C, the male flower with its bract; D, section of the fruit; E, the central column of the pistil, with one of the nuts in section; F, a seed.

aril. *Embryo* in the axis of fleshy albumen, with flat seed-lobes, and a superior radicle.

TRIBE 1. *Prosopidoclineæ*.—Ovule solitary. Seeds with a seed-coat (aril), and no albumen. Involucre globose, bladder-like, opening on one side, finally dropping off, containing from three to six flowers. Flowers diœceous, apetalous.

GENERA.

Schismatopora, Kt. | *Spixia*, Leandr. | *Pera*, Mutis. | *Peridium*, Schott.

TRIBE 2. *Euphorbiæ*.—Ovule solitary. Seeds albuminous. Flowers monœcious, apetalous; male and female mixed, in a eup-shaped involucre.

GENERA AND SYNONYMES.

Pedilanthus, <i>Neck.</i>	„ Keraselma, <i>Neck.</i>	„ Medusea, <i>Haw.</i>	Alcetoroctonum,
Crepidaria, <i>Haw.</i>	Athymalus, <i>Neck.</i>	Galerhæus, <i>Haw.</i>	[<i>Schlecht.</i>
Euphorbia, <i>L.</i>	Treisia, <i>Haw.</i>	Esula, <i>Haw.</i>	Poinsettia, <i>Grah.</i>
Tithymalus, <i>T.</i>	Dactylanthus,	Anisophyllum,	Anthostema, <i>A. Juss.</i>
Euphorbium, <i>Isn</i>	[<i>Haw.</i>	[<i>Haw.</i>	Dalechampia, <i>Pl.</i>

TRIBE 3. *Hippomaneæ*.—Ovule solitary. Flowers apetalous, in spikes; bracts one or many-flowered.

GENERA AND SYNONYMES.

Maprounea, <i>Aub.</i>	Sebastiania, <i>Sp.</i>	Psilostachys, <i>Trecz.</i>	Stillingfleetia,
Ægopricon, <i>L. f.</i>	Adenogyne, <i>Kl.</i>	Hippomane, <i>L.</i>	[<i>Boj</i>
Adenopeltis, <i>Bert.</i>	Sennefeldera, <i>Kl.</i>	Mançanilla, <i>Pl.</i>	Sapium, <i>Jacq.</i>
Colliguaja, <i>Mol.</i>	Actinostema, <i>Mart.</i>	Ophthalmoblapton	Triadica, <i>Lour.</i>
Dactylostemon, <i>Kl.</i>	Sarothrostachys, <i>Kl.</i>	[<i>Allem.</i>	Cœlebogyne, <i>J. Sm</i>
Gymnarrhen, <i>Lea</i>	Styloceras, <i>A. Juss.</i>	Pachystemon, <i>Bl.</i>	Microstachys,
Exœcaria, <i>L.</i>	Commia, <i>Lour.</i>	Omalanthus, <i>A. Juss.</i>	[<i>A. Juss</i>
Gymnanthes, <i>Swz.</i>	Synaspisma, <i>Endl.</i>	Carumbium, <i>Rnw</i>	Cnemidostachys,
Gussonia, <i>Sp.</i>	Hura, <i>L.</i>	Stillingia, <i>Gard.</i>	[<i>A. Juss.</i>

TRIBE 4. *Acalypheæ*.—Ovule solitary. Flowers apetalous, in clustered spikes or racemes.

GENERA AND SYNONYMES.

Tragia, <i>Pl.</i>	Ceratococcus <i>Msu</i>	Mappa, <i>A. Juss.</i>	Simmondsia, <i>Nutt.</i>
Schorigeram, <i>Ad.</i>	Anabena, <i>A. Juss.</i>	Macaranga, <i>Thou.</i>	Aparisthmium <i>Endl</i>
Traganthus, <i>Kl.</i>	Mercurialis, <i>L.</i>	Panopia, <i>Nor.</i>	Conceveibum,
Leucandra, <i>Kl.</i>	Linozostis, <i>Endl.</i>	Monospora, <i>Kl.</i>	[<i>L. C. R.</i>
Cnesmone, <i>Bl.</i>	Trismegista <i>Endl.</i>	Ctenomeria, <i>Kl.</i>	Omphalea, <i>L.</i>
Leptorhachis, <i>Kl.</i>	Acalypha, <i>L.</i>	Claoxylon, <i>A. Juss.</i>	Omphalandria,
Bia, <i>Kl.</i>	Cupameni, <i>Ad.</i>	Erythrochilus,	[<i>P. Br.</i>
Plukenetia, <i>Pl.</i>	Usteria, <i>Denn.</i>	[<i>Reinw.</i>	Duchola, <i>Ad.</i>
Sajor, <i>Rumph.</i>	? Otaturus, <i>L.</i>	Sarcoelinum, <i>Wt.</i>	Hecatea, <i>Thouars.</i>
Botryanthæ, <i>Kl.</i>	Galurus, <i>Sp.</i>	Givotia, <i>Griff.</i>	Cleidion, <i>Bl.</i>
Rhopalostylis, <i>Mrs</i>	Micrococca, <i>Benth.</i>	Conceveiba, <i>Aub.</i>	Alehornia, <i>Sol.</i>
Hedraiostylus, <i>Hssk</i>	Erythrococca, <i>Buth</i>	Cladogynos, <i>Zippl.</i>	Lasiostylis, <i>Presl.</i>
Pterococcus, <i>Hsk.</i>	Adenocline, <i>Turez.</i>	Platygyne, <i>Merc.</i>	

TRIBE 5. *Crotoneæ*.—Ovule solitary. Flowers usually having petals; in clusters, spikes, racemes, or panicles.

GENERA AND SYNONYMES.

Cephalocroton, <i>Kl</i>	Andiseus, <i>Fl. Fl.</i>	Jatropha, <i>Kun'h.</i>	Mandiocca, <i>Lk.</i>
Trachycaryon, <i>Kl.</i>	Aleurites, <i>Forst.</i>	Adenorhopium,	Aypi, <i>Bauh.</i>
Calyptrostigma, <i>Kl.</i>	Ambinix, <i>Com.</i>	[<i>Pohl.</i>	Camagnoc, <i>Aub.</i>
Bertya, <i>Planchon.</i>	Telopea, <i>Sol.</i>	Cureas, <i>Ad.</i>	Ricinus, <i>T.</i>
Garcia, <i>Rohr.</i>	Camirium,	Bromfeldia, <i>Neck.</i>	Spathiostemon, <i>Bl.</i>
Mabea, <i>Aubl.</i>	[<i>Rumph</i>	Castiglionia <i>R & P</i>	Baloghia, <i>Endl.</i>
Siphonia, <i>Rieh.</i>	Ostodes, <i>Bl.</i>	Cnidocolus, <i>Pohl.</i>	Ricinocarpus, <i>Desf.</i>
Hevea, <i>Aubl.</i>	Elæococca, <i>Comm.</i>	Bivonea, <i>Raf.</i>	Echinosphæra,
Elateriospermum <i>Bl</i>	Dryandra, <i>Th.</i>	Jussievia, <i>Houst.</i>	[<i>Sieb.</i>
Anda, <i>Murcgr.</i>	Vernicia, <i>Lour.</i>	Manihot, <i>Pl.</i>	Röperia, <i>Sp.</i>
Johannesia, <i>Vell.</i>	Abasin, <i>Kœmpf.</i>	Janipha, <i>Knth.</i>	Amperca, <i>A. Juss.</i>

Mozinna, <i>Orteg.</i>	Hæmatospermum, [Bl.]	Ricinoides, <i>T.</i>	Timandra, <i>Kl.</i>
Loureira, <i>Cav.</i>	Hendecandra <i>Eschs.</i>	Cascarilla, <i>Ad.</i>	Medea, <i>Kl.</i>
Hemicyclia, <i>W. & A.</i>	Asterogyne, <i>Bnt.</i>	Tridesmus, <i>Lour.</i>	Crozophora, <i>Neck.</i>
Gelonium, <i>Roxb.</i>	Adelia, <i>L.</i>	Aroton, <i>Neck.</i>	Tournesolia <i>Scop.</i>
Erythrocarpus, <i>Bl.</i>	Bernardia, <i>Houst.</i>	Luntia, <i>Neck.</i>	Chiropetalum, [A. Juss.]
Codiaeum, <i>Rumph.</i>	Crotonopsis, <i>L. C. R.</i>	Cinogasum, <i>Neck.</i>	Caperonia, <i>St. Hil.</i>
Phyllaurea, <i>Lour.</i>	Leptemon, <i>Raf.</i>	Brunsvia, <i>Neck.</i>	Cavanilla, <i>Fl. Fl.</i>
Tetrorchidium, [Pöpp.]	Friesia, <i>Sp.</i>	Ricinocarpus, [Boer.]	? Schinza, <i>Denn.</i>
Rottlera, <i>Roxb.</i>	Peripterygium, <i>Hsk.</i>	Zinostachys, <i>Kl.</i>	Ditaxis, <i>Vahl.</i>
Mallotus, <i>Lour.</i>	Heterochlamys, [Trcz.]	Pycnocomma, <i>Benth.</i>	Monotaxis, <i>Brong.</i>
Adisca, <i>Bl.</i>	Aphora, <i>Nutt.</i>	Agrostistachys <i>Dalz.</i>	Argythamnia <i>P. Br.</i>
Trewia, <i>L.</i>	Serophyton, <i>Benth.</i>	Julocroton, <i>Mart.</i>	Ateramnus, <i>P. Br.</i>
Tetragastris <i>Gürt.</i>	Eremocarpus <i>Benth.</i>	Podostachys, <i>Kl.</i>	Philyra, <i>Kl.</i>
Adriana, <i>Gaud.</i>	Engelmannia, <i>Kl.</i>	Astræa, <i>Kl.</i>	Trigonostemon, <i>Bl.</i>
Cheilosa, <i>Bl.</i>	Geisseleria, <i>Kl.</i>	Ocalia, <i>Kl.</i>	Trigostemon, <i>Bl.</i>
Acidoton, <i>Swartz.</i>	Pilinophytum, <i>Kl.</i>	Eutropia, <i>Kl.</i>	Ryparia, <i>Bl.</i>
Baliospermum, <i>Bl.</i>	Croton, <i>L.</i>	Cleodora, <i>Kl.</i>	Ryparosa, <i>Bl.</i>
Beyeria, <i>Miq.</i>			

TRIBE 6. *Phyllanthææ*.—Ovules in pairs. Stamens in the centre of the flowers.

GENERA AND SYNONYMES.

Cyclostemon, <i>Bl.</i>	Pseudanthus, <i>Sieb.</i>	Leptopus, <i>Dene.</i>	Anisonema, <i>A. Juss.</i>
Enchidium, <i>Jack.</i>	Stachystemon, [Planchon.]	Ceratogynum, <i>Wt.</i>	Glochidonopsis, [A. Juss.]
Briedelia, <i>W.</i>	Menarda, <i>Comm.</i>	Macraea, <i>Wight.</i>	Glochidion, <i>Forst.</i>
Heydia, <i>Denn.</i>	Xylophylla, <i>L.</i>	Reidia, <i>Wight.</i>	Bradlea, <i>Banks.</i>
Cluytia, <i>Ait.</i>	Genesiphylla, [Herit.]	Melanthesa, <i>Bl.</i>	Glochisandra, <i>Wt.</i>
Clutia, <i>Boerh.</i>	Phyllanthus, <i>L.</i>	Asterandra, <i>Bl.</i>	Gynoon, <i>A. Juss.</i>
Altora, <i>Ad.</i>	Niruri, <i>Ad.</i>	Kirganelia, <i>Juss.</i>	Seepasma, <i>Bl.</i>
Cratochyla, <i>Neck.</i>	Nymphanthus, [Lour.]	Ardenghelia, [Comm.]	Epistylum, <i>Swz.</i>
Andrachne, <i>L.</i>	? Cathetus, <i>Lour.</i>	Emblia, <i>Gürt.</i>	Eriococcus, <i>Hassk.</i>
Eraclissa, <i>Frsk.</i>	? Breynia, <i>Forst.</i>	Cicca, <i>L.</i>	Stylodiscus, <i>Benn.</i>
Arachne, <i>Neck.</i>	Peltandra, <i>Wight.</i>	Cheramela <i>Rmph.</i>	Microelus, <i>W. & A.</i>
Sauropus, <i>Bl.</i>		? Tricaryum <i>Lour.</i>	Bischofia, <i>Bl.</i>
Agynia, <i>L.</i>		Leptonema, <i>A. Juss.</i>	Poranthera, <i>Rudg.</i>
Leiocarpus, <i>Bl.</i>			
Micranthea, <i>Desf.</i>			

TRIBE 7. *Buxææ*.—Ovules in pairs. Stamens inserted beneath the sessile rudiment of an ovary.

GENERA AND SYNONYME.

Flüggea, <i>W.</i>	Geblera, <i>F. & M.</i>	Buxus, <i>T.</i>	Sarcococca, <i>Lindl.</i>
Richeria, <i>Vahl.</i>	Colmciroa, <i>Reut.</i>	Prosorus, <i>Dalz.</i>	Goughia, <i>Wight.</i>
Argonia, <i>Aubl.</i>	Savia, <i>W.</i>	Pachysandra, <i>Mx.</i>	Putranjiva, <i>Wall.</i>
Lithoxylon, <i>Endl.</i>	Actephila, <i>Bl.</i>	Thecacoris, <i>A. Juss.</i>	Nageia, <i>Gürt.</i>
Securinga, <i>Com.</i>	Tricera, <i>Swartz.</i>	Adenocrepis, <i>Bl.</i>	Hybanche, <i>Lamb.</i>
Discocarpus, <i>Kl.</i>	Crantzia, <i>Swz.</i>	Drypetes, <i>Vahl.</i>	Toxicodendron <i>Th</i>

DOUBTFUL GENERA.

Podocalyx, <i>Kl.</i>	Margaritaria, <i>L. f.</i>	Lascadium, <i>Raf.</i>	Desfontanea, <i>Fl. Fl.</i>
? Anthobolus, <i>R. Br.</i>	Suregada, <i>Roxb.</i>	Rhytis, <i>Lour.</i>	Mainea, <i>Fl. Fl.</i>
Meborea, <i>Aubl.</i>	Hexadica, <i>Lour.</i>	Baccaurea, <i>Lour.</i>	Oldfieldia, <i>Benth.</i>
Tephranthus, [Neck.]	Homonoia, <i>Lour.</i>	Lumanaja, <i>Blanc.</i>	Galcaria, <i>Zoll.</i>
Egotoxicum, <i>R. & P.</i>	Cladodes, <i>Lour.</i>	Lunasia, <i>Blanco.</i>	Cleistanthus, <i>Hook f.</i>
Extoxicum, <i>R. & P.</i>	Echinus, <i>Lour.</i>	Dovyalis, <i>E. Meyer.</i>	Microdesmis, <i>Pinch</i>
	? Ulassium, <i>Rumph.</i>		

GEOGRAPHICAL DISTRIBUTION.—The greatest number of this family is found between the tropics of America, whence they gradually diminish in frequency towards the poles. They are also found in the warmer parts of Africa and Asia, in Northern Africa, and throughout Europe.

PROPERTIES AND USES.—This family includes upwards of 2500 species, the greater number of which is possessed of a milky, acrid juice, sometimes volatile, and sometimes caustic, and of a resinous, or gum-resinous nature, in which the active properties of the plants reside. Some are frightfully poisonous, as the Manchineel; some are used as purgatives and emetics, as *Euphorbia*, *Ricinus*, and *Buxus*; others are tonic, astringent, and excitant, as *Cascarilla*. It is said that when this resin, or deleterious principle, is subjected to the action of heat, it disappears, and thus approaches the essential oils by its volatility and aroma, as in many species of *Croton*, particularly *Cascarilla*, *Lign-aloes*, *Caturus*, and others. In many, such as *Siphonia*, *Sapium*, *Mabia*, the milky juice, when become concrete, forms caoutchouc. This milky juice, when applied to the skin, is irritant, and causes inflammation; great care should therefore be taken, after handling any of this family, not to allow the hands to touch the tender parts of the body, such as the eyes, nose, and lips. The purgative properties are also found in the seeds, but it is worthy of remark that the acridity exists only in the embryo, and that the fleshy albumen, on the contrary, contains a large quantity of bland, fixed oil. Thus, in Castor oil and *Croton* oil, the purgative action resides only in the embryo.

According to Endlicher, *Euphorbia officinarum* is the plant that King Juba discovered in Barbary, and named after his physician, who was brother to Musa. It is a native of Africa, Arabia, and India, and is one of those cactus-looking species, without leaves, with erect, thick, fleshy stem and branches, having the appearance of candleabra; each branch is terminated by a red flower, and is covered with knobs, from which issue a sharp spine. It is called *Furbiurne*, by the Arabs, and *Dergmuse*, by the inhabitants of Atlas. This is the species supposed to yield Euphorbium, although *E. canariensis*, and *E. antiquorum*, have also been given as its sources. This is obtained by making incisions in the plant, from which flows an abundance of acrid, milky juice, that concretes on exposure to the air. Bruce states that he met with it in Abyssinia, where it is called *Kol-quall*, and says that, when the branches become old and withered, instead of milk they contain a powder, so acrid and piquant that it causes sneezing by merely shaking them; this powder is Euphorbium. *Euphorbium* is in the shape of tears, about the size of peas or larger, forked, or somewhat branched, of a pale, or deep yellow colour, and having a resemblance to manna; it has a vitreous fracture, and is without smell; its taste is at first slightly bitter, afterwards acrid and warm, like mezereon. It is one of the most powerful emetics and cathartics, often acting with great violence; even a very small quantity causes excessive pains in the throat, stomach, and bowels, vomiting, syncope, cold perspirations, and ultimately death. Its pulverization is a dangerous operation, on account of the dust which rises inflaming the nostrils, irritating the lungs, causing spitting of blood, and even dysentery, and therefore those who are thus employed require to protect their eyes, mouth, and nostrils. Applied to the skin it produces vesication, and for this purpose it is the only substance used by the

Mongols; it is now never administered internally, but is employed chiefly in the form of liniment, in paralysis, amaurosis, chronic rheumatism, and similar affections. This substance is principally used in veterinary practice, both for its vesicatory power and for curing scab in sheep. According to Pelletier, euphorbium consists of resin, wax, malate of lime, malate of potassa, lignin, bassorin, volatile oil, and water. Brandes found caoutchouc.

With the juice of *E. antiquorum*, mixed with flour, the Arabs make violently drastic pills, but the branches cooked furnish nutritious food to the camels. With the juice of *E. heptagona*, *E. virosa*, and *E. cereiformis*, the Ethiopians poison their arrows, as do the Brazilians with that of *E. cotinifolia*. In Cochin China *E. nerifolia* is used to make hedges. Its juice is purgative, and it is frequently administered, by the natives of India, in intermittents and visceral obstructions, in cleansing malignant ulcers, and in destroying warts on the skin. The leaves are used as hydragogues, and the root cures the bite of venomous serpents. The bruised leaves, mixed with margosa oil, are used in cases of contracted limbs, caused by severe rheumatism. The juice of *E. tribuloides*, a small, cactus-shaped species, growing in the Canaries, is there used as a diaphoretic. It is reported by Scopoli, in his "Flora Carniolica," that he has seen death occasioned by the administration of thirty grains of the seed of *E. esula*, and gangrene caused on the belly by the application of the plant on that part; he also adds that people have lost their eyesight by rubbing their eyes with its juice. The bark of the roots of *E. Gerardiana*, *E. amygdaloides*, and *E. cyparissias*, have furnished empirical remedies, having febrifuge reputations; but the last is known to possess dangerous properties. It is destructive to sheep, and La Motte has seen a woman perish from having taken a lavement prepared with the plant. In France it is used as a popular purgative, under the name of *Rhubarbe des pauvres*. Orfila regards it as a poison. *E. helioscopia* is a very common weed in Britain, where it is called *Wart-wort*, *Churn-staff*, *Cal's-milk*, and *Sun-Spurge*. Its juice is commonly applied to warts, for the purpose of destroying them; and it is also most improperly used to cure sore eye-lids, causing, in many instances, intolerable pain and inflammation. *E. peplus*, *E. peploides*, *E. pilosa*, and *E. patustris*, have the reputation of being remedies in hydrophobia. The juice of the last is used by the Siberians, in doses of five scruples, as a purgative, and is highly praised by the inhabitants as a remedy in intermittent fevers and obstructions; but the dose is excessive, and in any other country would be attended with very serious consequences. In countries bordering on the Mediterranean *E. peplus*, *E. spinosa*, *E. dendroides*, *E. aleppica*, and *E. apios*, are used as purgatives in domestic practice. *E. buxifolia*, in the West Indies, *E. papillosa*, in Brazil, *E. laurifolia*, in Peru, and *E. portulacoides*, in Chili, are used as purgatives. *E. tirucalli* is employed in India as a vesicant, and in Java as a powerful emetic and purgative. It is said that exhalations from the tree cause the loss of eyesight; the juice is considered sudorific, and, according to Sonnerat, is administered in India, in doses of a drachm, mixed with flour, daily, as an antisyphilitic. *E. ligularia*, another native of India, is held sacred to Munsu, the goddess of serpents; and the root of the tree, mixed with black pepper, is employed for the cure of snake bites, both internally and externally.

Several species of Euphorbias are used as antisyphilitics. *E. parviflora*, and *E. hirta*, are both so used in India, and *E. canescens* in Spain. The juice of *E. linearis* is employed in Brazil against syphilitic ulcers, and ulcers of the cornea. *E. hiberna* was formerly much used in syphilis, before the introduction of mercury. The plant is extensively employed by the peasantry of Kerry for stupefying fish, and so powerful are its qualities, that a small basket filled with the bruised leaves, will poison the fish for several miles down the river; the same properties are possessed by *E. platyphylla*, and, in Brazil, *E. cotinifolia* is used for the same purpose, while the acrid juice which drops from it is used by the natives to poison their arrows. A similar use is made of some of the species at the Cape of Good Hope. Paterson says "the branches are thrown into fountains of water frequented by wild beasts, which, after drinking the water thus poisoned, seldom get a thousand yards from the brink of the fountain before they fall down and expire." With the juice extracted from the Euphorbia, and a kind of caterpillar, peculiar to another plant, which has much the appearance of a species of rhus, the Hottentots poison their arrows. They mix the animal and vegetable matter, and, after drying it, they point their arrows with this composition, which is supposed to be the most effectual poison of the whole country.

The roots of some are administered as emetics; of these the most important are the two North American species, *E. ipecacuanha*, and *E. corollata*, both of which, in sufficient doses, act as emetics, and in smaller ones as diaphoretics and expectorants. For the same purpose *E. Gerardiana* and *E. pilhyusa* are recommended, about the Mediterranean coast. The leaves and seeds of *E. thymifolia*, a native of India, are given by the Tamuls as an anthelmintic, and in bowel affections of children. *E. hypericifolia* is regarded, in tropical America, as a powerful astringent, and has considerable reputation in the cure of diarrhœa and dysentery; it has also narcotic properties. *E. balsamifera*, when cooked, is eaten in the Canaries. The juice of *E. mauritiana*, when dried, is employed as a condiment, and it also forms one of the adulterations of scammony. The sap that exudes from the stem of *E. phosphorea*, in ancient forests of Brazil, shines on warm nights with a phosphorescent light.

Euphorbia lathyris is a native of several parts of Britain, and is called *Caper Spurge*, from its being used as capers; in America it is called *Mole Plant*, because moles are supposed to avoid the ground where it grows. Like other Euphorbias, its milky juice is of an acrid nature; its seeds yield an abundance of fine clear oil, called *Oil of Euphorbia*. This is obtained by expression, or by the aid of alcohol or ether, and is colourless, inodorous, and almost insipid; it rapidly becomes rancid, and acquires a dangerous acrimony. The oil is a powerful purge, operating with much activity, in doses of five drops, and is said to be less acrid and irritating than croton oil. It is necessary that it be always recently extracted, as it speedily becomes rancid, and has a disagreeable action. The seeds themselves, to the number of twelve or fifteen, are used by the country people in France as a purgative. The root of the plant is equally purgative, and particularly emetic. The leaves are vesicant, and are used by beggars to produce artificial ulcers, by which to excite pity. The juice is depilatory. *Pedilanthus tithymaloides*, called in the West Indies *Jew Bush*, and *P. pudifolius*,

are employed in decoction in venereal cases and amenorrhœa, under the name of *ponopilino*; the root is emetic, and, according to Poiteau, is called *ipeacacuanha* in St. Domingo.

As we have already said, there are some of this family remarkable for their highly poisonous character. Of these, *Excecaria agallocha*, a native of the East Indies, is one, the smoke arising from the burned wood of which is sufficient to cause intolerable pain and inflammation of the eyes; and if the juice itself touches the eyes it frequently causes blindness, and complete destruction of these organs. The juice is thick and nauseous, and violently purgative. The wood is resinous, with a bitter taste, and emits an agreeable odour, like benzoin, on combustion. It is supposed that this is one of the sources of Aloes-wood, or Lign-aloes, but the substance is with more reason ascribed to other sources—(see pages 286 and 629). The fruit, which is almost insipid, when first taken into the mouth, afterwards becomes acrid and burning. A decoction of the leaves of *E. camettia* is used in baths against syphilis, in India, where it is also applied to cleansing foul ulcers. But even more deleterious still is *Hippomane mancinella*, or *Manchineel Tree*, a native of the West Indies, South America, and Arabia, on the sea coast. It receives its name from the Spanish word *mancinilla*, signifying a small apple, its fruit having that resemblance. It has been reported by various writers that, so volatile and virulent is the poison of this tree, persons have died from merely sleeping under its shade. This, however, is an exaggeration, as it has been frequently proved beyond a doubt that no more danger arises from sleeping under that tree than from any others, inhabiting the same localities as those in which the manchineel grows. Ricord Madiana says he has travelled two leagues under its shade without experiencing any inconvenience. It nevertheless possesses highly poisonous qualities. All its parts, even the green fruit, are charged with a milky juice, which contains a considerable quantity of caoutchouc. This juice has the odour of wormwood and tansy bruised, and if this odour is inhaled for some time, it causes a pricking feeling all over the person, and a choking sensation in the throat. The juice is so acrid and corrosive that the natives poison their arrows with it, and it is said that negro-drivers dip the lash of their whips in it, to render the punishment of their victims more severe. The ripe fruit is the size of a small flat apple, with many deep furrows on the outside, and an agreeable odour of citron, which perfumes the whole air; the flesh is at first quite mild, but afterwards causes burning in the mouth. On account of this insipidity at first, some animals eat the fruit and die, having the stomach inflamed, and even perforated with black spots like the grounds of coffee. Bruce asserts that when it falls into the sea, fish and crabs that eat it are not injured, but those eating these animals are poisoned. The fruit, dried and pulverised, is an excellent diuretic, and the seeds, to the number of ten or twelve, are violently so. Besides the juice, the tree contains a resin similar to guaiacum, which is also diuretic, and is given in dropsics. The acrid and poisonous milky juice of *Sapium aucuparium* is so viscid that it is used in Central America as birdlime, for catching birds; it also produces caoutchouc. M. de Tussac states that a gardener, making cuttings from a species of *Sapium*, at Malmaison, having wiped the cutting-glass with his handkerchief, and afterwards having occasion to use it, his nose swelled to an alarming degree,

accompanied with erysipelas. The juice of *S. indica* is also very poisonous, and the seeds are used to intoxicate fish. Very similar properties are possessed by *Hura crepitans*, a native of the West Indies, as characterise the other plants of which we have just spoken. This is called the *Sand-box Tree*. Its fruit is of the size of a large apple, very much flattened, and formed of twelve or fifteen cells, like the segments of an orange, set round a common axis, and in each is contained a large flat seed, like those of *nuxvomica*, which are purgative and emetic. The fruit was used as a sand or pounce-box, before blotting-paper was so universal, but it was necessary to bind them with a hoop of iron, otherwise the power of elasticity of which they are possessed is so great that, even at the end of some years, they fly to pieces, with a loud report like firearms, and hence the origin of the specific name.

We come now to the consideration of those species that are more agreeable in their associations, and which yield a certain portion of the caoutchouc of commerce. Several plants of this family are endowed with this property, but that which furnishes the article in the greatest abundance is *Siphonia elastica*, a tree growing in Guiana and Brazil. The stem of the tree is from fifty to sixty feet, scaly like a pine apple, very straight, and branched at the summit. On being wounded the tree exudes a great quantity of milky juice, which, when dried and hardened by exposure to the air, forms *Caoutchouc*, or *Indian Rubber*; but there are other trees, belonging both to this and to other families, that furnish the same product; the variety obtained from *Siphonia* is what is called bottle-caoutchouc, from being moulded in the form of bottles. This is done by the natives making moulds of clay of the required shape, and smearing them over with successive layers of the juice, which they dry in smoke, and afterwards removing the clay from the interior. The other species furnishing this substance, in greater or less quantity, are *Excoecaria agallocha*, *Hippomane mancinella*, *Hura crepitans*, *Mabia periri*, *M. taquaria*, *Omphalia diandra*, *Plukenetia volubilis*, and *Sapium aucuparium*.

To enumerate the numerous uses to which caoutchouc is now applied would be no easy task. Not many years ago nothing was known of it, but that it served to erase the marks made by black-lead pencils; but both in its original and vulcanised state it forms, in the present day, one of the most important materials in the arts and manufactures. According to the analysis of Mr. Faraday, it contains 1.9 per cent. of vegetable albumen; traces of wax; 7.13 per cent. of a bitter azotised substance, soluble in water and alcohol; 2.9 of a substance soluble in water but insoluble in alcohol; 56.37 of water with a little free acid, and only 31.7 of the pure elastic principle to which chemists have given the name of caoutchouc; besides which it generally contains a portion of soot arising from the smoke used in drying it. Pure caoutchouc is nearly colourless, and in thin layers transparent. It is highly elastic, lighter than water; without taste and smell; fusible at about 248 degrees, remaining unctuous and adhesive upon cooling; inflammable at a higher temperature; insoluble in water, alcohol, the weak acids, and alkaline solutions; soluble in ether when entirely free from alcohol, and soluble also in most of the volatile oils, though at the expense of its elasticity. It is said, however, that the oils of lavender and saffras dissolve it without change, and that when precipitated by alcohol from its

solution in cajeput oil, it is still elastic. Its best solvents for practical purposes are coal-naphtha, an empyreumatic oil obtained by distilling caoutchouc itself, and oil of turpentine modified by one or two distillations. By the action of sulphur, caoutchouc acquires properties which greatly increase its value in the arts. It becomes of a black colour and a horny consistence, preserves its elasticity under the influence both of heat and cold; is compressible with great difficulty, and resists the ordinary solvents, such as petroleum and oil of turpentine. In this state it is said to be vulcanised. It is prepared by submitting caoutchouc in thin sheets to the action of a mixture composed of 40 parts of sulphuret of carbon and 1 of chloride of sulphur. According to Faraday, caoutchouc consists of 87.2 parts of carbon and 12.8 of hydrogen.

Aleurites triloba, a native of the Society Islands, and its variety *moluccensis*, called Camiri by the Javanese, have a nut with a very hard shell, the kernel of which is good to eat, and has the reputation of being aphrodisiac when the shell is roasted; without this precaution it is apt to purge, and even to cause cholera. An excellent bland oil, used both at table and for burning in Java, is extracted from the kernels. In Tahiti the tree is called Tiaily, and tissues are made from the bark; when tattooing was in repute among these people, the shell of the nut was burned to form a sort of lamp-black to be used in the operation. The tree exudes a gummy substance, which is chewed by the natives. From *A. laceifera*, a native of Ceylon, gum lac of a very superior quality is obtained in that island. *Croton draco* and *C. sanguifluum* both furnish a substance closely resembling Dragon's blood in the tropical parts of America.

A great number of the plants of this family are celebrated in the countries where they grow for purgative and emetic properties, and as remedies in syphilitic diseases. *Stillingia sylvatica* is a herbaceous plant growing in the southern states of North America, where it is called *Queen's delight* and *Queen's-root*. The root, when fresh, has a strong acrimonious odour, but is subdued by keeping, when it becomes somewhat oleaginous, and it has a bitter, pungent, acrimonious taste. In large doses it acts as an emetic and cathartic, but in smaller it is alterative, with a tendency to the secretions; it has been proved to be a valuable remedy in syphilis, scrofula, cutaneous diseases, and chronic affections of the liver. The same virtues are found in *Microstachys chamaelea* in India, and *Jatropha officinalis* in Brazil. The juice of *Tragia volubilis* is very caustic; it is used in Asia along with common salt as an application to the ulcers which form in the feet of the natives in those countries. The roots of *T. cannabina* is considered diaphoretic and alterative; and that of *T. involucrata* is given by the Vaidas as an alterative and corroborative in cachexia and inveterate syphilis. The hairs of the plant sting violently. *Mercurialis perennis* (*Dog Mercury*) grows abundantly in shady alpine woods in many parts of Britain. It is decidedly poisonous; its juice is emetic and its seeds dangerously purgative; fatal effects have resulted from the use of it. Linnaeus states that it is destructive to sheep, and Gesner asserts that it produces salivation. It has been stated that when boiled the plant furnishes an alimentary vegetable, but we would strongly discourage such a belief. In drying, the plant assumes a bluish tinge, indicating the presence of indigo; and M. Vogler has detected two colouring substances in the root,

one of which is blue and the other carmine. From the great abundance of this plant in some localities, therefore, its root might be rendered serviceable in the arts. Very much the same medicinal virtues are found in *M. annua*, also a native of this country. From the days of Pliny the most absurd superstitions have attached to *M. tomentosa*, a native of the south of Europe; where, even in the present day, the same nonsense is still credited, that if a woman after conception drink the juice of the male plant, she will give birth to a boy, and if of the female she will have a girl; and to render this assertion more absurd, the plant which they consider the male is in reality the female, and *vice versâ*. The juice of *Omphalodea triandra* is white at first, but afterwards becomes black, and is used in Guiana as a substitute for ink. *Croton campestre* and *C. perdecps* are considered diuretic and antisymphilitic by the Brazilians. But in the American *Orotos* a balsamo-resinous juice is found, which drops thick and fragrant from the plants. The resinous aromatic juice that flows from *C. balsamiferum* is applied externally as a vulnerary; and the distilled plant furnishes the liquor called *cau de mantes*, or *petit baume*, in the West Indies. The resin obtained from *C. thuriferum* and *C. adipatum*, on the banks of the Amazon, is used as incense; and the bark of these plants is used for the same purpose. On account of its aromatic qualities, *C. humile* is employed in medicated baths in the West Indies. The balsam that exudes from the bark of *C. organifolium* is considered a good substitute for balsam of Copaiba; and the bark and leaves are possessed of diaphoretic properties. The juice of *C. niveum* is considered vulnerary in South America, and that of *C. gratisimum* forms a celebrated aromatic cosmetic at the Cape of Good Hope.

The bark of some of the species supplies important medicines of an aromatic, stimulant, and tonic character. The celebrated *Cascarilla Bark* is obtained from *Croton casearilla*, a native of the Bahamas, and found abundantly in Hayti. It is a small shrub, three or four feet high, and is called *Sweet-wood Bark* and *Eleuthera Bark*, because it is gathered in the island of Eleuthera. The bark has an aromatic and agreeable odour, somewhat like that of musk, especially on burning; and a hot, aerid, and aromatic taste. Its constituents are albumen; a peculiar kind of tannin; a bitter crystallisable principle, called *casearillin*; a red colouring-matter; fatty matter, of a nauseous odour; wax; gum; volatile oil; resin; starch; petic acid; chloride of potassium; a salt of lime, and lignin. The oil constitutes 1·6 per cent; is of a greenish yellow colour, a penetrating odour analogous to that of the plant, and of the specific gravity of 0·938. *Casearillin* is white, crystallised, inodorous, of a bitter taste, very slightly soluble in water, soluble in alcohol or ether, neutral in chemical relations, and without nitrogen. In its medicinal virtues casearilla bark is aromatic, tonic, and febrifuge. It has been found highly useful in dyspepsia, chronic diarrhoea, and dysentery, flatulent cholice, and other cases of debility of the bowels and stomach. *C. nilens*, *C. casearilloides*, and *C. micans*, natives of South America, have pretty much the same properties as *C. casearilla*. *Copalchi bark*, of which there are two kinds, is yielded by *C. pseudo-china* and *C. suberosum*. That of the former is in small quills, of an ash colour, resembling a variety of pale cinchona, with the taste of casearilla; and that from the latter is in larger quills, with a cork-like epidermis, very bitter, and yielding an aromatic odour when burned.

Astringency is also a quality found in the Spurges. Roxburgh considers the bark of *Bridelia spinosa* as an excellent astringent; and it is said to kill the insects that are found on those animals which feed on its leaves. The common *Box Tree* (*Buxus sempervirens*) is esteemed sudorific, in the dose of one or two ounces in decoction, and may be used as a substitute for guaiacum, in rheumatism, and those diseases for which it is recommended. Its leaves are bitter and nauseous, with a disagreeable odour, particularly after rain, and are purgative in the dose of a drachm in powder; hence they are sometimes used as an adulteration of senna, but are easily detected by their shape and thickness. An oil, distilled from the wood, has been highly praised as a remedy against epilepsy. On the continent it is said that the brewers sometimes introduce Box into beer, as an adulteration for hops. It is said that no animal is nourished by feeding on the Box except the porcupine, and that camels, who are very fond of it, are destroyed by eating it. The wood of this tree is solid, hard, heavy, very close-grained, and of a pale yellow colour; it is exceedingly durable, and takes a very high polish. The principal use to which it is applied is wood-engraving—the whole of the illustrations in books and publications found incorporated with the text, being engraved on this kind of wood. It is also employed in turneryware, inlaying, and in the manufacture of mathematical scales and musical instruments. The greatest supplies of this article come from the Mediterranean and from Spain, but it also grows wild on chalky soils in this country, sometimes attaining a considerable size; and there are places where it has been cultivated profitably. Extensive plantations were made of it by the Earl of Arundel, on Box Hill, near Dorking, in Surrey, and the clearings of these plantations, in 1815, yielded £10,000.

The wood and bark of *Stylodiscus trifolius* are of a red colour; the former is used in Java for making masts. The bark and roots of *Codicium variegatum* are burning and aerid. The leaves of most of the species of *Phyllanthus* are considered diuretic, deobstruent, and tonic. *Plukenetia volubilis*, as we have already observed, supplies a portion of the caoutchouc of commerce. In India the shrub is planted about dwellings, because a delicate and agreeable dish is prepared with its leaves, cooked with the milk of the cocoa nut. A decoction of the leaves of *Acalypha cupamini*, along with a little garlic, is given to children in India as an anthelmintic; and with the leaves and young shoots the tongues of young children are rubbed to excite vomiting. Rheedo says that the decoction of the root and leaves of this plant is purgative, and if dropped into the ear cures earache; he also recommends its juice, mixed with oil, as a good antiarthritic and antisymphilitic liniment. The leaves of *A. betulina* are employed in India as an agreeable stomachic in dyspepsia and cholera; they are also regarded as attenuant and alterative. The flowers of *Caturus spiciflorus* are said to be specific in diarrhoea and similar disorders, either in decoction or conserve.

The oil produced by the seeds of this family is also of a cathartic nature. That obtained from those of *Croton tiglium* is called *Croton Oil*. The tree from which this oil is procured is a native of India, Ceylon, China, and almost the whole of that region, and in all its parts it is charged with an aerid, purgative principle. According to Rumphius, a few grains of the root is employed in Amboyna as a drastic purgative in dropsy; and the leaves are so aerid that, when chewed and swallowed, they excite painful

inflammation in the lips, mouth, throat, and throughout the whole course of the alimentary canal. The wood is said to be diaphoretic in small doses, but purgative and emetic in larger. The fruit of the tree is a capsule with three seeds, which are about the size of a large nut, somewhat four-sided, of a yellow colour, dappled with brown, or altogether black; they were formerly called *Grana moluccana*. When one of the seeds happens to be abortive, the two remaining are so pressed against each other as to cause them to assume the form of coffee, and present in the middle a distinct lateral impression, caused by the central column. The oil is extracted by grinding the seeds, placing the powder in bags, and pressing between plates of iron; the oil is allowed to stand for fifteen days, and then filtered. During the preparation of the oil it is very difficult to avoid the irritating effects of the acrid, volatile matter, which causes an eruption of large painful pustules. In its medicinal effects it is one of the most violent cathartics known, one or two drops often causing, within half an hour, copious watery evacuations; in over-doses it proves fatal. It is an invaluable remedy in dropsy, apoplexy, mania, and visceral obstructions, where immediate cathartic action is required. Applied externally, it causes an eruption of very painful pustules on the skin, and in this way has proved serviceable in rheumatism, gout, neuralgia, glandular and other indolent swellings, and in pulmonary diseases. It should be diluted with three parts of olive oil, soap, liniment, oil of turpentine, or other vehicle, and applied as a liniment twice or oftener in the twenty-four hours. The seeds yield 22 per cent of oil, and, on analysis, were found to contain traces of volatile oil, fixed oil, a peculiar fatty acid called *crotonic acid*, an alkaloid called *crotonin*, resin, stearine, wax, extractive, sugar, starch, gum, albumen, gluten, lignin, and salts. Crotonic acid is supposed to be the active principle of the seeds, and Crotonin has been found to be only a magnesian soap with an alkaline reaction. From the seeds of *C. camaza* and *C. moluccanum* an oil is extracted that has the same properties as Croton oil; and those of *C. Roxburghii* are esteemed by the natives of India as a good purgative, one seed bruised with water being given for each evacuation desired.

Another of these oils is the well-known *Castor Oil*, obtained from the seeds of *Ricinus communis*, which were employed, from a remote period, under the name of *Semina cataputiae majoris*. The plant may often be seen growing in flower-gardens and shrubberies, as an ornament, for which it is well fitted by its stately growth, its large, broad, palmate leaves, whence it was called *Palma Christi*, and its fine, glaucous, purplish appearance. It is a native of India and Africa, but grows freely during summer in the open air in this country; and it is cultivated in the Levant, Spain, Provence, the West Indies, Brazil, and the Southern States of North America. The seeds are very beautiful, and much resemble a beetle, beautifully dappled, and from being like the insect called the tick, or ricinus, the ancients applied that name to the plant. They seem to have been held in high estimation at a very early period, for they are among the articles that are found in Egyptian mummy cases. Taken internally they are a powerful cathartic, and sometimes emetic; two or three are sufficient to purge. The oil is extracted either by boiling in water, by expression, or extraction by alcohol. By the first process the seeds are slightly roasted, to coagulate the albumen, then cleaned of the integuments, bruised in a mortar, and the

paste boiled in water; the oil that rises to the surface is removed, and treated with an additional quantity of fresh water. By expression, the clean seeds are well bruised, placed in cloth bags, and submitted to pressure; a thick oil is obtained, which is filtered through cloth and paper to separate the mueilage. Extraction by alcohol is practised by triturating each pound of paste with four pounds of alcohol, and subjecting the mixture to pressure; the oil dissolved by the alcohol escapes freely; one half is recovered by the distillation of the spirit. The residue of the distillation is boiled in a large quantity of water; the oil separates, and is removed and gently heated to expel any adherent moisture, then filtered at the temperature of 90 degrees. Castor oil is a mild cathartic and an excellent purgative, especially in old persons and very young children. When distilled it yields a colourless, highly odorous, volatile oil, which crystallises by cold; two oleaginous acids, called *ricinic*, and *ricino-oleic*, which are excessively acid and nearly concrete; and a solid spongy residue, amounting to the third of the oil employed. By the action of nitric acid it is converted into a peculiar oleaginous substance, called *palmin*, which yields *palmic acid* and *glycerin* when saponified. Alkalies unite with castor oil, forming soaps, and determine the formation of three acids, the *ricinic*, *ricino-oleic*, and *ricino-stearic*, which can be obtained separately. At page 654, we have already treated of oil of Euphorbia, the seeds of which were called *Semina catapulice minoris*.

The seeds of *Curcas purgans*, called *Barbadoes Nuts*, *Purging Nuts*, and *Physic Nuts*, yield an oil which has the same purgative properties as croton oil, though less powerful, and is chiefly used for burning in lamps. The leaves, warmed and rubbed with castor oil, are used as a poultice to hasten suppuration. The milky juice, boiled with oxide of iron, forms the black varnish used by the Chinese for covering boxes. *C. multifidus* produces a purgative oil, called *Pinkhoe Oil*, which is said to be dangerous in its results; a single seed is said to be purgative. The bark of *Anda braziliensis* is poisonous, and water in which it has been soaked is destructive to the life of animals that drink it; the natives of Brazil employ it for stupefying fish. The fruit, which are one-seeded, two-celled nuts, are preserved in oil; and the seeds they contain have from time immemorial been employed as purgatives, in the dose of two or three. An oil extracted from the seeds is used for burning in lamps, for friction of the body, and for painting. With the fruit of *Hyænanche globosa*, reduced to powder, the colonists at the Cape of Good Hope poison hyænas, by rubbing it into the flesh of dead sheep. *Stillingia sebifera* is cultivated in China for the sake of its seeds, which supply a sort of concrete oil, of which candles are made. This fatty substance is also made use of, in medical preparations, as a substitute for lard. The decoction of the plant is useful, mixed with the oil of mustard seed, to anoint those attacked with nocturnal fevers. The nuts of *Elæococca verrucosa*, a native of Japan, yield an oil which in that country is eaten, although somewhat acrid; but in the Mauritius the tree is cultivated, and the oil is there used for burning. That obtained from the nuts of *E. vernicia*, in China is used for painting.

The fruit or seeds of some are perfectly harmless. Those of *Conceveiba guianensis* are said to be delicious. The fruit of *Cicca disticha* are of the size of a cherry, transparent, of a waxen white colour, ribbed on the sides; they are eaten both cooked or in pickles and preserves, and have a pleasant

subacid flavour. The leaves of the plant are sudorific, and the seeds cathartic. The fruits of *Emblica officinalis* are what are known as *Emblie myrobalans*. When fresh they are about the size of a gall-nut, very acid and somewhat purgative; when dry they become very much wrinkled, have a slightly aromatic odour, and an acid, astringent taste. They are used in India against endemic fevers. Dr. Fleming says that a strong decoction in a solution of common salt is given in India as a tonic in dysentery and gout, as a deobstruent for the spleen and mesenteric glands, and in chronic rheumatism. The fruits are also in frequent use for tanning leather and in the manufacture of ink. The capsules of *Cluytia collina* are exceedingly poisonous.

Notwithstanding the generally acrid character of the family, there are instances where they contain such an abundance of fecula, that when the acidity is removed it forms a valuable nutriment. This we find highly exemplified in the plant producing *Tapioca*. This is *Manihot utilisima* (*Jatropha manihot*), a native of South America and the West Indies. In Brazil it is called *mandisca*, and in the West Indies *cassava*. The plant is a shrub about six or eight feet high, with palmated leaves, green flowers, and a white, fleshy, tuberous root of immense size, sometimes weighing thirty pounds. The juice of the plant is very poisonous; a small quantity of it killing birds, quadrupeds, and even man himself, by causing vomiting, convulsions, cold perspirations, swelling of the body, and ultimately death; but this deleterious principle is very volatile, for if the juice is exposed to the air for thirty-six hours it loses these properties. Even in the root this principle is found along with the fecula, and is used by the Indians to poison their arrows. It is in the form of an acrid, milky juice, rendering the root highly poisonous if eaten in the fresh state. The water in which it is boiled is poisonous; and in Brazil a decoction of the root is used for catching birds, by setting it in arid places where the birds come to drink, from which they become so stupefied that they can be taken hold of without difficulty. This poisonous quality has been discovered to be owing to the presence of hydrocyanic acid. The plant is of rapid growth, and the root comes to perfection in about six months. When taken up, the roots are washed and scraped; they are then grated or ground into a pulp, and the pulp submitted to pressure, by which the deleterious juice is expressed and preserved. The meal or pulp that remains in the press, being dried, is called *couaque*, and is made into bread or cakes, which are called *cassava bread*; the poisonous principle being so volatile, that any which remains is dissipated in the drying and cooking. The expressed juice, after being allowed to stand, deposits a white powder, which, after being well washed and dried, constitutes what is called *Tapioca meal* or *Brazilian arrowroot*, and by the French *moussache*; in Guiana it is called *cypipa*. This is formed of rounded grains having a central dark point, and of remarkably equal size, the density of which to arrowroot is as 14 to 16. When *moussache* is dried on hot plates, the grains partly burst, and the fecula agglomerates in irregular semiopaque gum-like masses, and this is what is called *Tapioca*. All the products of this root are nutritious and easy of digestion. The natives frequently ferment the expressed juice with molasses, and form an intoxicating beverage called *ouycou*, that supplies the place of wine and beer of temperate climates. There is a factitious tapioca found in the shops,

consisting of very small, smooth, spherical grains, supposed to be prepared from potato starch, and sold by the name of *Pearl Tapioca*.

There is another species, or variety as some suppose, known as the *Sweet Cassava* (*Manihot aipi*), which is in every respect similar to the preceding, or Bitter Cassava, except in the root being entirely destitute of deleterious properties; even in its fresh state it may be eaten with impunity, either raw or merely roasted or boiled. It yields the same quantity of amylaceous matter as the other, and is also cultivated, though not to the same extent. *Cnidoscolus quinquelobus* (*Jatropha urens*) is covered in all its parts with hairs that sting severely. The root of *C. herbaceus* is used in Mexico and Carolina in the same way as that of the manioc.

Another property of this extensive family is to yield colouring-matter. A kind of *Turnsole*, called by the French *Tournesol en drapcaux*, or *Rag Turnsole*, is obtained from *Crotophora tinctoria*. This is an annual, growing abundantly in the whole basin of the Mediterranean. The colouring matter, says Guibourt, which constitutes Turnsole does not exist in the plant from which it is extracted, any more than archil in lichens, or indigo in the plants in which it is found. It is chiefly through the influence of the air, and particularly of ammonia, that this substance is produced. The whole plant is first bruised, the juice expressed, and rags soaked in the juice, which is green. After these rags are dried, they are exposed in vats, at the bottom of which is a mixture of stale urine and chalk. The ammonia disengaged from this mixture acts upon the rags, and changes them from green to violet blue. If they are required to be of a deeper colour they are soaked a second time in the juice, and again subjected to the influence of the ammonia. This kind of Turnsole is chiefly made in Languedoc, and is almost entirely bought up by the Dutch, who use it in colouring pastry, wines, sugar-papers, the outsides of their large cheeses, and for calico printing; it is said that they also re-dissolve the colouring matter in the rags, mix it with potash and chalk, and thus make eake turnsole—(See also Lichenes). In France a spurious *sirop de violette* is made of the root of iris florentina, coloured with turnsole, but such a syrup has not the beautiful blue colour of the violet. The juice of the plant is acrid, with emetic and drastic properties; the powdered seeds, mixed with oil, are used as a cathartic. The seed-vessels of *Rottlera tinctoria*, a native of Circassia, are covered with a red powder, which dyes silk a bright red; it is said the root largely possesses the same property. *Maprounea brasiliensis* yields a fleeting black dye. The plant is used in decoction, both as a lavement and a drink, in disordered stomach, and it is without the white acrid juice so characteristic of the rest of the family.

African Teak, or *Oak*, is the wood of *Oldfieldia africana*.



ORDER CLXXXIV.—MYRISTICACEÆ.—NUTMEGS.

TROPICAL trees or shrubs, with coloured juice. *Leaves* alternate, not

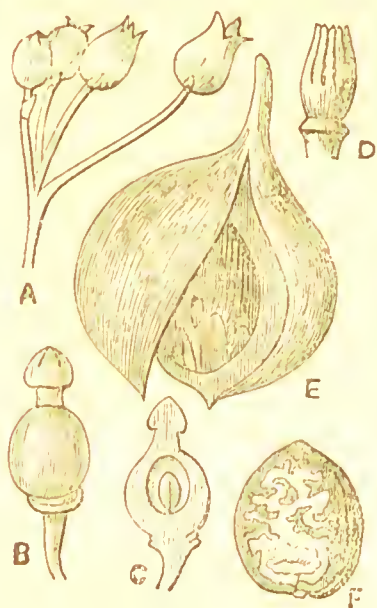


Fig 200. A, Flower of *Myristica moschata*; B, the same deprived of its perianth; C, section of ditto, showing the ovule; D, the stamens; E, the fruit; F, section of a nut, showing the embryo in the base.

dotted, and without leaflets at their base. *Flowers* unisexual, either in the axils of the leaves, or terminal, arranged in racemes, heads, or panicles, almost always furnished with a small bract. *Perianth* three-cleft, rarely four-cleft, valvate in æstivation. *Stamens* three to twelve, united into a column; *anthers* turned outwards, two-celled, bursting longitudinally, and either distinct or connate. *Ovary* free, solitary (rarely two), one-celled, containing a single, erect, inverted ovule. *Style* terminal, very short, or wanting, terminated by a lobed stigma. *Fruit* a sort of capsular berry, opening in two valves, one-seeded. *Seed* erect, nut-like, covered with a lacinated fleshy seed-coat (aril). *Albumen* penetrated by the interior membranous covering of the seed, giving it a mottled appearance. *Embryo* small, in the base of the albumen, with somewhat leafy, flat, or plaited seed-lobes, and a very short inferior radicle.

GENERA AND SYNONYMES.

<i>Myristica</i> , L.	<i>Pyrrhosa</i> , Bl.
<i>Virola</i> , Aubl.	<i>Horsfieldia</i> , W.
<i>Sebophora</i> , Neck.	<i>Hyalostemma</i> , Wall.
<i>Knema</i> , Lour.	

GEOGRAPHICAL DISTRIBUTION.—They inhabit the tropics of Asia and America, and are not found in Africa, if we except Madagascar.

PROPERTIES AND USES.—These are more or less aromatic in all their parts; the juice is styptic, becomes red on exposure to the air, is charged with a viscid colouring-matter, and is not altogether void of acrid properties. The bark is acrid and astringent. The seed and seed-coat both contain a fixed and an essential oil, and both are used as spices.

The *Nutmeg Tree* (*Myristica moschata*) is a native of the Moluccas and neighbouring islands, but is now cultivated in Java, Sumatra, Penang, the Isle of Bourbon, Mauritius, and other parts of the East, and in Cayenne, Martinique, and some of the West India islands. It attains the height of thirty feet, with a straight stem, and a branching head. The juice is acrid, viscid, and abundant; of a red colour, and dyes linen a permanent colour. The leaves are oblong-oval, glossy on the upper surface, and whitish beneath, and with an aromatic taste. The flowers are male and female on different

trees, insignificant, and of a yellowish colour. The fruit is round or oval, about the size of a small peach, with a smooth surface, green at first, but becoming yellow when ripe. The external covering, which may be called a husk, is thick and fleshy, containing an austere, astringent juice; becoming dry by maturity, it opens in two valves, and discovers the nut covered with its aril, or mace, which is of a beautiful blood-red colour; beneath the mace is a brown, shining shell, containing the kernel, or nutmeg.

A plantation of nutmeg trees is always made from seed, and it is not till the eighth or ninth year that the trees produce flowers. The sexes being on different trees, after the plants are two years old, they are all headed down, and grafted with scions taken from the female tree, reserving only one male stock for fecundation. The natives of the Moluccas gather the fruit by hand, strip off and reject the pulpy husk, detach the mace carefully, and expose it to the sun, which soon changes its beautiful blood-red colour to a light brown; it is then sprinkled with sea-water to render it flexible and preserve it. The nuts are first sun-dried and then smoked, until the kernels rattle against the shell. This shell being removed, the kernels are dipped twice or thrice in lime water, laid in heaps for two or three days, wiped, and packed in bales or barrels. There are two varieties of the nutmeg, distinguished as the "green" and the "royal;" the royal is larger, and produces mace longer than the nut, while that of the green extends only half-way down.

Nutmegs are too well known to require description. The best are small and round, and are to be preferred to those that are large and egg-shaped. It is said that they are often perforated and boiled, in order to extract their essential oil, and the orifice carefully closed to avoid detection; but the fraud may easily be discovered by their lightness; the oil is contained in the dark veins which penetrate the kernel. It has been found that, in 500 parts, the nutmeg contains 120 of a white, insoluble, oily substance; 38 of a coloured, soluble oil; 30 of a volatile oil; 4 of acid; 12 of fecula; 6 of gum; 270 of lignin; and 20 of loss. *Butter of Nutmegs* is obtained by bruising the kernels into a paste, which is compressed in bags between hot metal plates, and is the fixed oil of nutmegs. This is met with in commerce in the form of flattened, square masses, of a yellowish colour, solid, marbled internally, 500 parts containing about 60 of essential oil. There are two varieties of it; one in small earthen pots, of mace colour, and very agreeable smell, is exported from the Moluccas to Holland; the other, obtained from Holland in flat cakes, far inferior to the first, and is usually adulterated with spermaceti and animal fat. This concrete oil has a certain acidity, and, employed in liniments, excoriates the skin, after being rubbed for some time. It is composed, according to Schrader, of 52.09 per cent of a soft, oily substance, yellowish or brownish, soluble in cold alcohol and ether; 43.75 of a white, pulverulent, inodorous substance, insoluble in these liquids; and 4.16 of volatile oil. The pulverulent constituent has been called *Myristicin*; it has a silky lustre, melts at 88 degrees, and yields in saponification glycerin and *Myristic acid*. The *Essential Oil of Nutmegs* is obtained by powdering the kernels and distilling with water; it is of a pale straw-colour, lighter than water, soluble in alcohol and ether, with a pungent taste, and a very strong nutmeg odour. Upon standing it deposits a crystalline stearoptine, which is called by John *Myristicin*.

Mace is, as we have already said, the seed-coat or aril of the nut, and is in the form of a lacerated membrane. When fresh it is of a blood-red colour, but becomes brown on drying. This is the most aromatic part of the fruit, and contains fixed and essential oils; it softens in the mouth, but does not melt; its taste is warm, aromatic, fragrant, and similar to a mixture of cinnamon and cloves, but more intense. Mace consists of an essential oil in small quantity; a fragrant, red, fixed oil, very soluble in alcohol and ether; a peculiar gummy principle, in the proportion of about one-third, analogous to amidin and gum; and a small portion of ligneous fibre. A decoction of mace contains a portion of both these oils in suspension in the gummy solution; ether is the best solvent for procuring all the oily matters. The *volatile oil of mace* obtained by distillation is a yellow liquid, lighter than water, of the fragrance and flavour of mace; but traces of an oil heavier can also be obtained by distillation. The *fixed oil of mace* is obtained by expression; it is of a buttery consistence, brown colour, and highly fragrant. It is very stimulant, and much employed in India as a liniment and embrocation in rheumatism.

The aromatic property of nutmeg and mace are familiar to every one; but it may not be generally known that they also possess considerable narcotic powers. In the quantity of two drachms, nutmeg has been known to produce stupor and delirium, accompanied with oppression of the chest, intense thirst, and headache; and dangerous if not fatal consequences are said to have followed its free use in India. Both nutmeg, mace, and their respective oils, administered in moderation, are stimulant, stomachic, and tonic. The unripe fruit is frequently preserved in sugar in the East; and before doing so it is necessary to deprive it of its acrid properties by soaking it in spirits.

The aril and kernel of other species possess similar properties. *Myristica spuria*, found in the Philippines, is there called *Dooghan*, *Dunghan*, or *Gonogono*; but its kernel loses its aroma after it is a year old. The red juice that flows from incisions made in the bark is used as a substitute for dragon's blood. *M. tomentosa*, or *male nutmeg*, is weak in its odour and disagreeable in flavour; among the inhabitants of Amboyna it has an aphrodisiac reputation. *M. officinalis*, a native of Brazil, is employed against cholic and dyspepsia; it contains a concrete oil, recommended against gout and rheumatism. The mace of *M. otoba*, mixed with lard, is used as a friction against the itch. A resin or gum resin exudes from the tree, and is employed by the natives of central America against many diseases. *Virola sebifera* is a large tree of Guiana, and by incision of the trunk yields a reddish, acrid, viscid juice, which concretes on exposure to the air; and this is used for aphthous ulcers, and soaked in cotton for filling decayed teeth. The mace of *Pyrrhosa tingens*, a native of Amboyna, is mucilaginous, and tinges the fingers fiery red; mixed with lime it forms a red pigment, with which the natives dye their teeth. In New Guinea, where the insipid nutmegs are common, those who eat them are soon after subjected to violent evacuations of the bowels and disturbance of the stomach.

ORDER CLXXXV.—CALYCANTHACEÆ.—CALYCANTHUS.

AROMATIC shrubs, with quadrangular stems, having four axes of growth exterior to the old wood. *Leaves* opposite, without leaflets at their base. *Flowers* hermaphrodite or unisexual by abortion, and either axillary or terminal. *Perianth* of numerous, somewhat thick, coloured segments, arranged in several series, the exterior bract-like, and the interior petal-like, all united below into a flesh-tube or cup. *Stamens* numerous, inserted in the rim of the fleshy tube; the inner sterile, but the outer with adnate, extrorse, two-celled anthers, bursting longitudinally. *Ovaries* several, superior, distinct, enclosed within the enlarged perianth, each with its own style and stigma; one-celled; ovules two, placed one above the other, inverted, ascending. *Fruit* composed of several one-seeded nuts, enclosed within the tube of the permanent perianth. *Seed* ascending, without albumen. *Embryo* with convolute, leafy seed-lobes, and an inferior radicle.

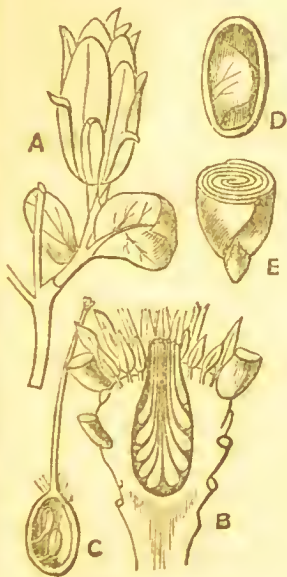


Fig. 291. A, Flower of *Calycanthus floridus*; B, section of ditto, showing the hollow receptacle; C, section of the ovary; D, section of a nut; E, section of the embryo.

GENERA AND SYNONYMS.

Chimonanthus,	„ Buttneria, <i>Duh.</i>
[Lindl.]	Beurreria, <i>Ehret.</i>
Meratia, <i>Nees.</i>	Basteria, <i>Ad.</i>
Calycanthus, <i>L.</i>	Pompadoura, <i>Bouch.</i>

GEOGRAPHICAL DISTRIBUTION.—They are only found in North America and Japan.

PROPERTIES AND USES.—*Calycanthus floridus* is called *Carolina Allspice*. The flowers have a sweet scent; the wood and roots smell strongly of camphor; the bark is aromatic, similar in fragrance and vigour to cinnamon, and is used in America as a stimulant tonic. *Chimonanthus fragrans* is a native of Japan, and has flowers of delightful fragrance; but its bark and leaves are inodorous, and have a biting, acrid taste.



ORDER CLXXXVI.—MONIMIACEÆ.—MONIMIA FAMILY.

AROMATIC trees or shrubs. *Leaves* opposite, very rarely alternate,

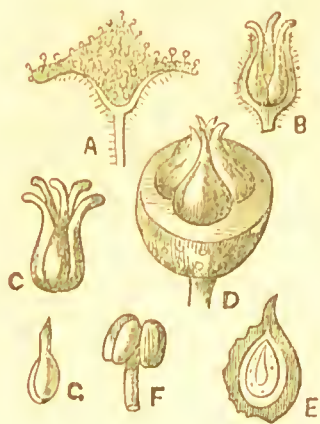


Fig. 202. A, Section of a sterile flower of *Monimia rotundifolia*; B, ditto of a fertile flower; C, the ovaries; D, fruit, with part of the persistent perianth removed, showing the nuts.

woolly underneath, without leaflets at their base. *Flowers* unisexual, presenting the form of either a globular or calyx-like involucre, the segments of which are arranged in two series. In the former case, this involucre has only a few small teeth at its summit, and in the male flowers it bursts and opens in four pretty deep and regular lobes, the whole upper surface of which is filled with stamens having very short filaments, and each forming a male flower. In the latter case, the stamens cover only the inferior and tubular part of the involucre; the filaments are longer, and towards their base they are each furnished with a pedicellate tubercule; anthers two-celled; cells opposite, sometimes adnate to a connective extended in a point beyond them, either opening longitudinally or by ascending valves. The female flowers are composed of an involucre, absolutely similar to that of the males. *Ovaries* several, one-celled, one-ovuled, sometimes entirely free in the base of the involucre, or imbedded in its thick part, having nothing but the summit free and visible, which is a

small, conoid head, forming the true stigma. *Ovules* solitary, erect, or pendulous, inverted. *Style* and *stigma* simple. *Fruit* a drupe, with several one-seeded nuts, or seed-like nuts with feathery styles, enclosed within the tube of the permanent perianth. *Seed* pendulous, with a straight embryo in the axis of abundant fleshy albumen, flat seed-lobes, and a superior radicle; or erect, with a straight embryo in the base of spare, fleshy albumen, very short seed-lobes, and a fleshy, inferior radicle.

TRIBE 1. *Monimieæ*.—Anthers opening longitudinally. *Ovules* pendulous. *Drupe* with several one-seeded nuts. *Embryo* straight, in the axis of copious fleshy albumen, radicle superior.

GENERA AND SYNONYMS.

<i>Ambora</i> , Juss.	<i>Monimia</i> , Thouars.	<i>Tetratome</i> , Pöpp.	<i>Ruizia</i> , Pav.
<i>Tambourissa</i> , [Son.]	<i>Kibara</i> , Endl.	<i>Hedycarya</i> , Forst.	<i>Peumus</i> , Pers.
	<i>Brongniartia</i> , Bl.	<i>Boldoa</i> , Juss.	<i>Mollinedia</i> , R. & P.
<i>Mithridatia</i> , Com.	<i>Citrosma</i> , R. & P.		

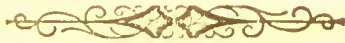
TRIBE 2. *Atherospermeæ*.—Anthers opening by valves from below upwards. *Ovules* erect. *Nuts* one-seeded, with the feathery styles adherent. *Embryo* in the base of spare albumen, with an inferior radicle.

GENERA AND SYNONYMS.

<i>Atherosperma</i> , Lab.	„ <i>Pavonia</i> , Ruiz.	<i>Doryphora</i> , Endl.
<i>Laurelia</i> , Juss.	<i>Thiga</i> , Molina.	

GEOGRAPHICAL DISTRIBUTION.—They are mostly found in South America, Australia, New Zealand, Mauritius, Madagascar, and Java.

PROPERTIES AND USES.—Aromatic and somewhat camphorous properties reside in these plants. The leaves of the species of *Citrosma* abound in oil of citron. All the parts of *Boldoa* are aromatic; it has an eatable, fleshy fruit, and the seeds yield a thick oil; the wood and leaves are very fragrant, and of the former a charcoal is made that is preferred by the smiths of Chili to all others; the bark is used by tanners. The wood of *Doryphora sassafras* is called “sassafras” by the colonists of Australia; it smells like fennel. The leaves of *Laurelia aromatica* are used in Chili as a condiment, and the nuts have the odour of the nutmeg. A decoction of the bark of *Atherosperma moschata*, either in a green or dried state, is used in Australia as a substitute for tea, and when taken with plenty of milk has a pleasant taste; but its effects are slightly aperient.



ORDER CLXXXVII.—URTICACEÆ.—NETTLES.

TREES, shrubs, or herbaceous plants, sometimes with a milky juice.

Leaves alternate, generally furnished with leaflets at their base, and, in most cases, covered with rough stinging hairs. *Flowers* unisexual, either solitary, or collected in various forms, sometimes like catkins, at others in heads, sometimes in a fleshy involucre, that is either spread open and flat, or closed and pear-shaped, as in the Fig. *Perianth* of four or five divisions, or merely a simple scale. *Stamens* three, four, or five, inserted at the base of the divisions of the perianth, and opposite them; *anthers* two-celled, turned inwards, opening either longitudinally or all round into two plates. *Ovary* free, one-celled, containing a solitary ovule, erect or suspended. *Stigmas* one or two, sessile. *Fruit* composed of hard-shelled nuts, enveloped in the fleshy perianth, and formed into a head; or inclosed within the fleshy receptacle. *Seed* erect or pendulous, with or without albumen. *Embryo* straight or hooked, or spirally coiled; radicle superior.

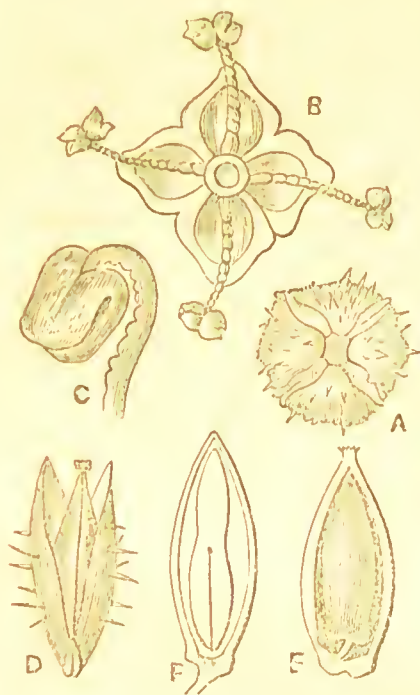


Fig. 203. A, Male flower of *Urtica dioica* closed; B, the same expanded; C, a stamen; D, a female flower; E, section of ovary; F, section of seed.

TRIBE 1. *Urticæ*—Flowers solitary, or in catkins, or in close heads. Ovule solitary, erect. Embryo straight,

in fleshy albumen, with flat seed-lobes, and a superior radicle.

GENERA AND SYNONYMES.

<i>Urtica</i> , T.	<i>Malaisia</i> , Blanco.	<i>Orcocnide</i> , Miq.	<i>Forskolca</i> , L.
<i>Urera</i> , Gaud.	<i>Schychowskyia</i> Endl.	<i>Nerandia</i> , Gaud.	<i>Cuidbeja</i> , Forsk.
<i>Laportea</i> , Gaud.	<i>Pilea</i> , Lindl.	<i>Parietaria</i> , T.	? <i>Australina</i> , Gaud.
<i>Flourya</i> , Gaud.	<i>Dubreuilia</i> , Gaud.	<i>Freirea</i> , Gaud.	<i>Myriocarpa</i> , Benth.
<i>Girardinia</i> , Gaud.	<i>Haynea</i> , Schum.	<i>Thaumuria</i> , Gaud.	<i>Morocarpus</i> , Zucc.
<i>Dendrocnide</i> , Miq.	<i>Pellionia</i> , Gaud.	<i>Gesnouiina</i> , Gaud.	<i>Hemistylis</i> , Benth.
<i>Elatostema</i> , Forst.	<i>Splitgerbera</i> , Miq.	<i>Pouzolzia</i> , Gaud.	? <i>Aphananthe</i> ,
<i>Langeveldia</i> ,	<i>Bohmeria</i> , Jacq.	<i>Memorialis</i> , Ham	[Planch.
[Gaud.	<i>Duretia</i> , Gaud.	<i>Rousselia</i> , Gaud.	? <i>Gironniera</i> , Gaud.
<i>Vaniera</i> , Lour.	<i>Procris</i> , Comm.	<i>Soleirola</i> , Gaud.	<i>Nemostigma</i> Pleh
	<i>Leucocnide</i> , Miq.	<i>Helxine</i> , Requ.	? <i>Chætachne</i> Planch

TRIBE 2. *Cannabineæ*.—Male flowers, in racemes or panicles; females in a sort of spike or cone, called a strobile, as in the Hop. Ovule solitary

suspended. Embryo without albumen, hooked, or spirally twisted; radicle superior, lying against the back of the seed-lobes.

GENERA AND SYNONYME.

Cannabis, *T.* | *Humulus*, *L.* | „, *Lupulus*, *T.*

TRIBE 3. *Moreæ*.—Flowers inconspicuous, arranged in heads, spikes, or catkins. Fruit consisting of nuts, either enclosed in the fleshy perianth, and formed into heads, or enclosed within the succulent receptacle. Ovule suspended. Embryo with fleshy albumen, hooked; radicle superior. Juice milky.

GENERA AND SYNONYMS.

* *Fruit composed of nuts enveloped in the succulent perianth, and collected into a head, as in the Mulberry.*

<i>Epicarpurus</i> , <i>Bl.</i>		<i>Ampalus</i> , <i>Boj.</i>		<i>Broussonetia</i> , <i>Vent.</i>
<i>Albrandia</i> , <i>Gaud.</i>		<i>Batis</i> , <i>Roxb.</i>		<i>Papyrius</i> , <i>Lam.</i>
<i>Morus</i> , <i>T.</i>		? <i>Fatoua</i> , <i>Gaud.</i>		<i>Maclura</i> , <i>Nutt.</i>

** *Fruit enclosed within the fleshy receptacle, as in the Fig.*

<i>Sycomorpha</i> , <i>Miq.</i>		<i>Tenorea</i> , <i>Gasp.</i>		<i>Cystogyne</i> , <i>Gasp.</i>		<i>Pogonotropis</i> , <i>Miq.</i>
<i>Ficus</i> , <i>T.</i>		<i>Urostigma</i> , <i>Gasp.</i>		<i>Galaglychia</i> , <i>Gasp.</i>		<i>Synæcia</i> , <i>Miq.</i>
<i>Erosma</i> , <i>Both.</i>		<i>Macrophthalma</i> ,		<i>Covellia</i> , <i>Gasp.</i>		<i>Erythrogync</i> , <i>Visi.</i>
<i>Sycomorus</i> , <i>Gasp.</i>		[<i>Gasp.</i>		<i>Pharmacosycca</i> <i>Miq.</i>		<i>Leucosyke</i> , <i>Zoll.</i>
<i>Caprificus</i> , <i>Gasp.</i>		<i>Visiania</i> , <i>Gasp.</i>				

TRIBE 4. *Artocarpeæ*.—Flowers in heads. Ovule erect or suspended. Embryo straight, with or without albumen; radicle superior.

GENERA AND SYNONYMS.

<i>Brosimum</i> , <i>Sic.</i>		<i>Macquira</i> , <i>Aubl.</i>		<i>Myrianthus</i> , <i>Palis.</i>		<i>Trophis</i> , <i>P. Br.</i>
<i>Piratincra</i> , <i>Aubl.</i>		<i>Trymatococcus</i> ,		<i>Artocarpus</i> , <i>L.</i>		<i>Streblus</i> , <i>Lour.</i>
<i>Galactodendrum</i> ,		[<i>Pöpp.</i>		<i>Sitodium</i> , <i>Banks.</i>		<i>Achymus</i> , <i>Sol.</i>
[<i>Humb.</i>		<i>Sorocca</i> , <i>St. Hes.</i>		<i>Rademachia</i> , <i>Th.</i>		<i>Bruca</i> , <i>Gaud.</i>
<i>Antiaris</i> , <i>Lesch.</i>		<i>Pourouma</i> , <i>Aubl.</i>		<i>Soccus</i> , <i>Rumph.</i>		<i>Perceba</i> , <i>Aubl.</i>
<i>Lepurandra</i> ,		<i>Cecropia</i> , <i>L.</i>		<i>Polyphema</i> , <i>Lour.</i>		<i>Bagasca</i> , <i>Aubl.</i>
[<i>Nimmo.</i>		<i>Musauga</i> , <i>Chr. Sm.</i>		<i>Iridaps</i> , <i>Comm.</i>		<i>Castilloa</i> , <i>Carv.</i>
<i>Olmedia</i> , <i>R. & P.</i>		<i>Coussapoa</i> , <i>Aubl.</i>		<i>Conocephalus</i> , <i>Bl.</i>		<i>Aporosa</i> , <i>Bl.</i>

GEOGRAPHICAL DISTRIBUTION.—They are found in almost every region of the known world. The *Urticæ* are met with from the poles to the tropics; the *Cannabineæ* are confined more to the north temperate regions of the Old World; and the *Moreæ* and *Artocarpeæ* belong more particularly to the tropics and regions adjacent, although some of them, such as the Mulberry and the Fig, submit to cultivation in northern latitudes.

PROPERTIES AND USES.—The principal characteristic of the *Urticæ* is the acridity found in the limpid juice; and this we find exemplified in the common stinging nettles. This acridity is owing to the presence of bicarbonate of ammonia, or, as some say, to free formic acid. They also yield a considerable quantity of fibre, and a certain amount of colouring matter.

The *Great Nettle* (*Urtica dioica*) is met with too abundantly in most parts of these kingdoms; it is generally found in waste places, in hedge-row banks, and among rubbish.

From time immemorial the bark of this plant has been employed in the manufacture of textile fabrics, particularly by the ancient Egyptians; in Siberia, even at the present day, it furnishes the inhabitants with fishing-lines and cordage; and M. Bonafous states, that in many villages of Piedmont, it is converted into cloths. A plant so abundant as this is, might be employed to some useful purpose, when fibrous materials are so much in demand and the supply so limited. When the plant is required to furnish fibre, it should be cut in the middle of summer, and afterwards treated like hemp; the fibre might be put to many uses, and among others it has been found to make good paper. The roots yield a colouring matter, and, when boiled with alum, dye yarn of a yellow colour. The young shoots in spring supply a wholesome vegetable, when boiled in the same way as other greens; and in some parts of the country, they are extensively used in this way. As a fodder for domesticated animals, the Great Nettle has been cultivated in Sweden for a very long period. Cows fed upon it yield a greater quantity of milk, and of richer quality. Horses are fattened and improved in appearance by the seeds being mixed in their corn, so that jockeys always so use them to give a lively air to the animal before selling him. Fowls eat the seeds with great avidity, and by mixing them in their food they become fat and are much increased in weight. The whole plant has been considered excitant, lithontriptic, emmenagogue, antiasthmatic, aperient, and astringent. A decoction of the plant, strongly salted, will coagulate milk, without giving it any unpleasant flavour. By analysis, M. Salladin found this plant to contain nitrate of lime, hydrochlorate of soda, phosphate of potash, acetate of lime, lignin, silica, and oxide of iron. The seeds contain a certain quantity of oil, which in Egypt is extracted and applied to domestic purposes. The *Small Nettle* (*U. urens*) is of considerably less size than the preceding, and is found in cultivated grounds. It stings more violently and virulently than the other, and is possessed of somewhat like properties. On analysis, M. Salladin found it to contain carbonate of ammonia, particularly in the glands at the base of the stinging hairs; an azotised matter; chlorophylle united with a little wax; mucus resembling gum; a black colouring matter; tannin united with gallic acid; and nitrate of potash. *U. pilulifera*, found in some parts of this country, is still more virulent than either of the preceding.

But the action of the above is not to be compared with that of *Urtica crenulata*, a native of India, which produces the most poisonous stings with intolerable pain, and without either pustules or inflammation. The effect extends to the nostrils, causing frequent sneezing, an abundant flow of mucus, and a contraction of the back of the jaws threatening tetanus. If the part stung be immersed in cold water before the effects of the poisoning are exhausted, the pain returns with redoubled vigour. Another species called *Devil's Leaf* (*U. urentissima*), a native of Timor, inflicts such a sting, that M. Leschenault says its effects last for a whole year, and that it even causes death; it is called *Daoun setan* by the natives. *U. heterophylla* is the most widely diffused of the Indian nettles. Dr. Roxburgh says that it is the most ferocious-looking plant he ever saw. The leaves are four to eight inches long, nearly as broad, and, like the stem, covered with stiff, acute bristles; the least touch of any part produces the most acute pain, but fortunately of short duration. The bark abounds in fine strong fibre, of a

glossy, silk-like appearance, and is used in Assam for the manufacture of cloth; the Chinese prize it for its softness as well as strength, and it has proved, by experiments made in this country, to be "a beautiful, soft, silky kind of flax, of a wonderful fibre, the tow of which would be useful for mixing with wool, as has been done with China-grass, and the fibre used for the finest purposes. The tubers of *U. tuberosa* are nutritious, and are eaten by the natives of India, either raw, boiled, or roasted. The seeds and herbage of *U. membranacea* are used in Egypt as an emmenagogue and apodisiac. *Boehmeria (Urtica) nivea* is a native of India, China, and Japan, and furnishes the excellent fibre known as *China-grass*, and called by the Chinese *Tchouma*, by the Malays *Ramee*, and in Sumatra *Caloce*. It is of extraordinary strength, and has been proved to be three times stronger than the fibre of hemp of the finest description. Besides its strength, it possesses great beauty, fineness, and softness; by the Malays it is used for sewing thread, for twine, and for making fishing-nets; and the Chinese grass-cloth is made from it. It is the same plant as is sometimes called *Urtica tenacissima*. In Japan an oil is expressed from the seeds. In Brazil the foliage of *Boehmeria caudata* is used in baths as a relief for hemorrhoids, and an extract of *Pilea mucosa* as a remedy for dysuria. *Pellitory-of-the-Wall (Parietaria officinalis)* is an old domestic remedy as a diuretic, emollient, and refrigerant; but it is only as a diuretic that it is of any service, and this arises from the quantity of nitre it contains, and which it derives from walls on which it grows. The expressed juice is also used, and the fresh plant is applied as a cataplasm to painful ulcers.

Cannabineæ.—The Hemp and the Hop are the two plants constituting this tribe, and both are remarkable for their narcotic properties. The *Hemp (Cannabis sativa)* is a native of Persia, Caucasus, and the mountainous regions of northern India; but it is cultivated in many parts of Europe and America, where the climate is sufficiently hot, for the sake of its fibre, and in other parts as an ornamental plant. The plant abounds in a resinous substance, which is secreted in much greater quantity in India, from the greater heat of the country, than is met with in Europe, and it is in this resinous extract that the narcotic properties reside. In India, the inhabitants smoke the leaves, either as tobacco or mixed along with it; and from the leaves they also prepare a narcotic liquor, called *Hashish*, or *Bang*. The same use is made of it by the Hottentots and the Brazilians, the latter of whom, in addition to smoking it, form it into pills, which they take to induce agreeable reveries and cause them to forget their hard lot. The *Extract of Hemp* has been called *Cannabin*; it is a powerful narcotic, causing exhilarating intoxication, delirium, drowsiness, and stupor. It also acts as a decided aphrodisiac, and induces an increase of appetite. But the greatest value of Hemp is in its furnishing a strong fibre, so extensively used in the manufacture of ropes, sacking, and other appliances in the arts. The seed is extensively consumed by small cage birds; and from it is expressed a valuable fixed oil used in Russia for lamps; it has a disagreeable smell, but little taste, and is also used for making soap, and for varnishes.

The *Hop (Humulus lupulus)* is a native of Europe, and is extensively cultivated, both on the continent and some counties of England, for its fruit, which is used in communicating to beer its intoxicating and bitter properties. The bitter principle of the Hop is called *lupulin*, and is obtained by

rubbing and sifting the heads. It was found to contain in 120 grains, 5 of tannin, 10 of extractive, 11 of bitter principle, 12 of wax, 36 of resin, and 46 of lignin. Hops are tonic and moderately narcotic, and have been highly recommended in diseases of general or local debility. The complaints in which they have been found most useful are dyspepsia, and the nervous tremours, wakefulness, and delirium of drunkards. Lupulin has been found to be a very effectual antaphrodisiac in doses of six to twelve grains. The young shoots of the hop are eaten as asparagus; the roots have been used as a substitute for sarsaparilla and as a sudorific, and they contain starch.

Moreæ.—Some of the *Moreæ* abound in a milky juice, which is mostly acrid and corrosive, in others a colouring principle is found, and many yield caoutchouc.

The *Mulberry* (*Morus nigra*) is a native of Persia, but now cultivated in most countries of Europe, Asia, and America, for its agreeable, acidulous, succulent fruit, which is eaten in the dessert. From the fruit a pleasant light wine may be made, and it may also be converted into an excellent preserve; in Siberia, the inhabitants extract alcohol by distillation, and, by long fermentation, convert the juice into vinegar. The bark contains a good deal of fibre, and is capable of being converted into cordage, textile fabrics, and paper. The wood is employed in cabinet-work, but it is light and much less compact than that of the white mulberry, weighing only 40 lbs. 7 oz. to the cubic foot. The leaves are eaten by cattle, and they are also given as food to silkworms, but when long fed on them they generally die, and the silk they yield is of small quantity and of bad quality. The berries, when eaten in quantity, are cooling and laxative; and De Cándollo says, the root is bitter and acrid. The *White Mulberry* (*Morus alba*) is that which supplies food to the silkworm. It is a native of China, whence it has passed westward through India, Persia, Greece, Italy, and the south of Europe, where it is extensively cultivated. There are several varieties of the tree in the silk-growing countries, and of these, that which is the best adapted for cultivation as food for the silkworm is *M. a. multicaulis*. The *White Mulberry* is a much more rapid grower than the black, and its leaves are not only less rough and more succulent, but they contain more of the glutinous, milky substance, resembling caoutchouc, which gives tenacity to the silk produced by the worms fed on them. The fruit is white or reddish, sweet, and with an insipid taste. The root of the white mulberry has a considerable reputation as a vermifuge, and it is said that it is an excellent remedy against tænia in the dose of three or four ounces of the decoction. The *Red Mulberry* (*Morus rubra*) is one of the most valuable trees of the United States. The fruit is deep-red, of an agreeable, sweet flavour, with a slight acidity, and is as highly esteemed as that of the black mulberry. It forms a large tree, sixty to seventy feet high, and six feet in the circumference of the stem. The wood is fine-grained, compact, solid, strong, and is by many considered equal in strength and durability to the locust. It is confined to the western states, and cannot be obtained in any quantity. The fruit of *M. indica* is acid, and the young leaves are eaten as a vegetable. The fruit of *M. celtidifolia* and *M. corylifolia* are eaten both raw and preserved, with sugar, in Peru; that of *M. tatarica* is eaten raw in Tartary, as well as dried and made into a sweetmeat; it is of a

reddish or pale colour, and I think it is very likely to have been the fruit of this species that I received some years ago from the late Mr. Barker, of Suadia, in Syria, in a dried state, and covered with the same pulverulent, saccharine matter as dried figs, and not at all unlike them in flavour; they were quite sweet, and most agreeable to eat.

The tree that supplies the dyewood called *Fustic* is *Maclura tinctoria*, a native of the West Indies and South America. The colour of the wood is sulphur-yellow, and it dyes woollen cloth not merely that colour, but also green, bronze, and various compound colours. It owes its colouring properties to a peculiar principle named *morin*, or *morin acid*. The dyewood yielded by this tree is distinguished as *old fustic*, while young fustic is supplied by *rhus cotinus*, as has been already described at page 241. The *Osage Orange* (*Maclura aurantiaca*) is a tree growing from twenty to sixty feet high, and a native of North America. The fruit is about the size of a large orange, and consists of radiating and somewhat woody fibres, with a tuberculated surface of a golden colour, and is filled with a fetid, yellow, milky juice, with which the native Indians smear their faces when going to war. This fruit is eatable, and a few years ago it was attempted to cultivate the tree for the fruit in this country, but fortunately without success, as it does not appear ever to have been used anywhere as an article of human food. Both in this country and America, the tree forms excellent fences, and is now cultivated for that purpose. The wood is bright yellow, very fine grained, and elastic; the Indians between the Mississippi and the Rocky Mountains use it for making their bows, and hence the tree is called in America *Bow-wood*; it also yields colouring matter, and might possibly be as well adapted for the purposes of dyeing as that of fustic.

The *Paper Mulberry* (*Broussonetia papyrifera*) is found in Japan and throughout the whole of Polynesia, where its fibre furnishes the inhabitants with paper and clothing. In Japan, a great deal of paper is made, and all from the bark of this tree; the mode of preparation is as follows:—After the tree has shed its leaves in December, the branches are cut off about three feet in length, tied up in bundles, and boiled in a ley of ashes; thus they stand in a covered kettle till the bark is so shrunk that half an inch of the woody part is seen bare at the ends. They are then taken out and left in the open air to cool, cut up lengthwise, and the bark stripped off. The bark is again soaked three or four hours in water, and, when it becomes soft, the fine black skin is scraped off with a knife, and the coarse bark is separated from the fine, which produces the whitest paper. It is again boiled in fresh ley, the whole stirred with a stick, and fresh water added, till the fibre separates. The washing is then performed in a brook by means of a sieve, by stirring the bark incessantly till the whole is reduced to the consistence of a fine pulp, and on being thrown into water it separates in the form of meal. It is then further mixed in a small vessel with a decoction of rice and *Hibiscus manihot*, and stirred well about till it has attained a tolerable consistence. After this it is poured into a wider vessel, from whence the sheets are taken on forms made of grass-straw, and laid one upon another in heaps, with straw between, that they may be easily lifted up. They are then pressed till the water is separated, and laid upon boards in sheets to dry in the sun. In the islands of the Pacific, the natives make their cloth of the bark of this tree. They strip off the bark and lay it

in a running stream to soak, secured from floating away by heavy stones; when it has been softened sufficiently, it is scraped with a shell very carefully, dipping it continually in the water till nothing remains but the fine fibres of the inner bark. Thus prepared, they are spread out on plantain leaves in lengths of about eleven or twelve yards, one by the side of another, till they are about a foot broad; after the superfluous water has drained off or evaporated, the fibres adhere close together, and the whole may be lifted off the ground in one piece. It is then taken and laid on a large, flat, and smooth piece of wood, and beaten with small wooden clubs, which causes it to spread in breadth, and after it has been sufficiently beaten, it is fit for use; it is dyed red, yellow, and of various colours, according to taste.

The innumerable species of *Ficus* are all natives of the tropical and extratropical regions, where some of them form enormous trees in the primeval forests, extending their immense arms over a great extent of ground, on supports which they throw down and take root in the soil, as we find in the Banyan; others rear a wide-spreading, umbrageous head, on the summit of a lofty, columnar trunk, far above the other inhabitants; many raise themselves by embracing and climbing up their more stately neighbours, or ramble and creep along the surface of the ground, throwing out roots from their stems. The most noted of all the species is the *Common Fig* (*Ficus carica*), so extensively cultivated in the East, and the fruit of which is brought to this country in a dried state. We here make use of the term "fruit," because it is that by which it is best known; but what we call the fruit of the fig is in reality not the fruit, but the enlarged receptacle, bearing the real fruit on its inner surface; the real fruit being those innumerable small seeds found on the inside of the fig. It may be as well to state, for the benefit of the uninitiated, that the flowers of the fig-tree are never apparent to the eye, but are contained in those fruit-like bodies produced in the axils of the leaves; and it is not till one of these is opened that the flowers are visible. What is therefore termed the fruit is merely the receptacle become fleshy, and assumed the form of a hollow body, bearing on its interior wall the flowers or fruit of the fig. The fig-tree, in all its parts, abounds in a viscid, milky juice, and this is found even in the fruit before it arrives at maturity; this juice is acrid, and is used on the continent to destroy warts; in Pliny's time it was thought to cure the bites of venomous animals and mad dogs; taken internally it is purgative. The fresh fruit of the Fig is very agreeable, and many varieties are cultivated in this country for that purpose; in some parts of the coast of Sussex they grow freely, and bear abundant crops as standards in the open air, but they are generally grown against walls and in fruit-houses. In the East a practice has been followed from time immemorial, of increasing the productions of the Fig, by what is called "caprification," and it is maintained still. It consists in hanging branches of the wild fig on those of the cultivated variety; the fruit of the wild plant contain a great number of eggs of an insect called *Cynips psenes*, the larvæ of which, as soon as they are hatched, crawl over the cultivated tree, pierce the fruit, or rather the receptacle, and, passing over the flowers in its interior, convey the pollen from the male to the female flowers, and thus hasten and secure fecundation. Figs are dried either in the sun or in stoves, and are known under different names, according to the places where they are produced; they form the

great part of the food of certain peoples of Africa, and even the peasantry of some parts of Italy and Spain; with us they are only eaten as a dessert. In its fresh state the fig is a wholesome and agreeable fruit; and when dried they are considered nutritious, pectoral, demulcent, and emollient, but, if eaten in large quantity, they produce flatulence, pain in the bowels, and diarrhœa. In the Canaries, Portugal, and the Levant, a spirit is distilled from the fermented fruit.

The *Pipul*, or *Sacred Fig* of India (*Ficus religiosa*), is sacred to the Hindoos, because they say Vishnu was born under it. They look upon it as an emblem of the Deity. Near them the most esteemed pagodas are generally erected; under their shade the Brahmins spend their lives in religious solitude, and the natives of all castes and tribes are fond of the cool recesses, beautiful walks, and lovely vistas of this umbrageous canopy, impervious to the hottest beams of a tropical sun. The juice of the tree contains caoutchouc, and it is used by the natives as bandoline to gum the hair. It is said that the dried fruit, reduced to powder, and then put in water for fifteen days, cures asthma, and induces fertility in barren women. The lac insect abounds on it. *F. indica* is the *Banyan*, the fruit of which is employed by Indian doctors, in the form of an electuary, as a tonic. The milky juice is used to cure toothache, and applied to cracks in the feet; it also yields caoutchouc. An infusion of the bark is regarded as an excellent tonic. *F. benghalense* and *F. Benjamina* grow with the same umbrageous habit as the two preceding species; the fruit of the former is red, the size of a cherry, and is eaten by monkeys; its leaves are deobstruent, and used against dropsy; the branches of the latter, bruised, heal the wounds caused by poisoned arrows. *F. racemosa* is a native of Malabar, and its fruit is eatable, possessing astringent properties. The juice of the tree is regarded as a powerful tonic, if drank for several days. The leaves of *F. septica* are emetic; its milky juice is used in Cochin China to destroy proud flesh, and the insects that are sometimes engendered in ulcers in those warm countries. The leaves of *F. politoria* are so rough that they are used for polishing wood and ivory in India. The juice of the fruit of *F. tinctoria* is used in Tahiti to dye cloths. It is at first a green colour, but, being acted upon by the juice of a species of *Cordia*, it becomes of a bright red. The juice of *F. toxicaria* is a violent poison. From *F. elastica* the caoutchouc of India is obtained; but as we have treated so fully on that subject at page 656, we shall not repeat it here.

From *Ficus indica* and *F. religiosa* the resinous substance called *Lac* is obtained, as well as from *Aleurites laccifera*, belonging to the Spurge Family—(see page 657). Lac is found in the form of a crust, surrounding the twigs or extreme branches, and is generally supposed to be an exudation from the bark, owing to the puncture of an insect called *Coccus laccæ*, in order to deposit its eggs; by some it is thought to be a secretion from the bodies of the insects themselves. There are three varieties of it known in commerce, as Stick lac, Seed lac, and Shell lac. *Stick lac* is the resin as taken from the tree, still encrusting the small twigs around which it originally conercted, and often containing the dead insect; this, when chewed, colours the saliva of a beautiful red colour, and, when burned, emits a strong, agreeable odour. *Seed lac* is the stick lac boiled in water, and deprived of its red colour. *Shell lac* is seed lac melted and formed into a

thin crust, by pouring it on a flat, smooth surface to harden. According to Dr. John, stick lac contains a colouring matter, a peculiar body to which he gave the name of *laccin*, and resin. By the analysis of Unverdorben, who made resinous bodies his particular study, lac contains the following substances: 1, a resin, soluble in alcohol and ether; 2, a resin, soluble in alcohol, but insoluble in ether; 3, a resinous-looking substance, a little soluble in cold alcohol; 4, a crystallisable resin; 5, a resin soluble in alcohol and ether, but insoluble in naphtha, and uncrystallisable; 6, fat of cocculus, not saponified, together with some oleic and margaric acid; 7, wax; 8, *Laccin*; 9, a red colouring matter. *Laccin* is a hard and brittle substance, of a yellow colour, and with a certain degree of transparency; when heated it gives out an aromatic odour, becomes soft, and chars without melting. It is insoluble in cold water, and becomes soft in hot water, cold and hot alcohol; but neither these, ether, or the essential oil dissolve it. It is, however, dissolved by potash ley, or concentrated sulphuric acid. The chief use of Lac is in the manufacture of sealing-wax, of which it is the principal ingredient; dissolved in alcohol, by means of heat, it forms cements for broken china and earthenware, and it is also extensively employed as the base of some varnishes.

Ficus sycamorus is the *Sycamore Tree* of Scripture. It is a very large tree, growing abundantly in Egypt, Syria, and the East; it produces red figs, about the size of an egg, but almost quite insipid; the Egyptians eat them fresh with great relish, for dried they are of no value, being then tasteless, unpleasant, and full of seeds. The fig of this species is an article of great consumption in those countries, and the people who superintend the gathering of the fruit are called "sycophants;" wine and vinegar are made from the fermented fruit; the wood has been employed from great antiquity in making mummy-cases.

F. paludosa is a native of Java, where it is called *Poutou Tan* by the Malays. It produces a resin, at first clear and limpid, which acquires a slight consistence on exposure to the air; this juice is a sort of caoutchouc, and is mixed with that of *Terminalia* vernix to make a more brilliant and solid varnish than it does when used alone.

The drug called *Contrayerva* was supposed to be the root-stock of *Dorstenia contrayerva*, but there are other species from which it is also obtained, *Contrayerva* being a Spanish word, used indiscriminately to signify a counter-poison. *D. brasiliensis*, called by Pison and Marcgrave *Caa-apia*, is a small plant, a native of Brazil; the roots of which are emetic, and are used by the inhabitants as *ipecacauha*, under which name

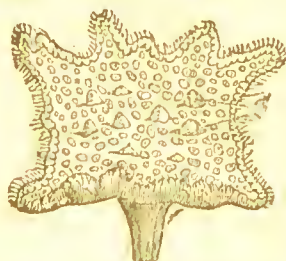


Fig. 204.
Dorstenia contrayerva.

it is also known; but the principal use is as an antidote to poisons and poisoned wounds. The juice of the plant is applied to the bites of venomous serpents, and wounds caused by poisoned arrows. The roots-stocks have an acrid, piquant taste, without bitterness, and with the odour of fig-leaves. *D. contrayerva*, a native of the West Indies, Mexico, and Peru; *D. Drakeana*, found in Brazil and Mexico; and *D. Houstoni*, in Campeachy, have all the same properties, and equally furnish the counter-

poisonous drug. Besides this property, which is regarded as a very doubtful one, *Contrayerva* is considered as a stimulant, tonic, and diaphoretic; but it is very little used in medical practice. I have here introduced a figure, to illustrate the curious arrangement of the flowers of this plant and its allies, which are crowded together on a square, flat receptacle. In this case the whole arrangement may be described as a fig turned inside out; for the flowers of the fig are arranged in the same way, only the receptacle in that case, instead of being square and flat as in *Dorstenia*, is formed into a hollow body, bearing the flowers on its inner surface.

Artocarpeæ.—These abound in a viscid milky juice, containing caoutchouc. The most important plants of the alliance is the *Bread-fruit Tree* (*Artocarpus incisa*). It is a native of the South Sea islands and some parts of the East, where its fruit forms the principal food of the inhabitants, and its bark furnishes them with clothing. The tree is thirty to forty feet high, with a stem a foot or a foot and a half in diameter. The fruit is of the size of a man's head, or larger, and sometimes weighs as much as fifty pounds; they are round, greenish, covered with prominent papillæ; their flesh is composed of a white, fibry pulp, becoming succulent and of a yellowish colour at maturity. This pulp contains a great quantity of starch, which is made into bread. There are two varieties of Bread-fruit, one containing seeds and the other without them. It is the former that is held in the greatest estimation and is the most generally cultivated, and its fruit is much larger than that of the other. The fruit of both varieties have an unpleasant smell, and the taste of the internal esculent part is not unlike that of the cabbage. The trees endure for centuries, and bear their fruit, not only on the largest branches, but even on the stem itself for the space of eight months together. The natives of Polynesia, before eating it, cut it in quarters and roast it on the ashes; the seeds are as large as chesnuts, and are also eaten either boiled or roasted. In Ceylon the Bread-fruit forms the principal food of the inhabitants. During the different stages of its growth at which it is used for food, it receives three distinct names. It is called "pollos" when it has attained the size of an ostrich egg, and is a month or six weeks old; "herreli" when it is half ripe, of the size of a cocoa-nut, and the pulpy esculent part is still of a white and milky appearance; in both of these states the fruit cannot be used without previous preparation. When perfectly ripe it is called "warreka;" the pulpy part is then fit for use, and that in which the seed is enclosed has a sweetish taste, of a yellow colour, and, without any previous preparation, is both catable and relishing. The Cingalese prepare thirteen different dishes with the fruit, all of which, from the ingredients used, are of a very savoury character. The fruit is sometimes dried for use during those months when it is not to be had fresh; for this purpose they gather it half ripe, and extract the pulpy part, which they either leave entire or cut into slices; it is then boiled a little and dried in the sun, after which it is hung up in a chimney or some dry place in order to preserve it. When thus prepared, it may be kept a whole year, and is eaten by the poorer inhabitants with scraped cocoa-nut, either in the dried state or boiled up afresh. A confection is made of the seeds and their pulpy membrane, by first frying them in cocoa-nut oil, and either wiping or draining them dry; they are then boiled in a syrup of sugar, dried, and preserved in glass bottles well corked. The

bark of the Bread-fruit tree furnishes a fibrous tissue, of which the Indians make a great part of what clothing they use; in Tahiti it is almost all made of this, a portion being furnished from the Paper Mulberry, of which we have already given the description. To the South Sea Islander this tree is what the reindeer is to the Laplander—everything. As Sir William Hooker has happily remarked, “the fruit serves for food; clothes are made from the fibre of the inner bark; the wood is used for building houses and making boats; the male catkins are employed as tinder; the leaves for tablecloths and for wrapping provisions in; and the viscid milky juice affords birdlime.” A fruit of *A. integrifolia*, the *Jack tree* of India, is very similar to that of the Bread-fruit, but is more liable to decay, and it is used in the same way: it furnishes excellent timber, at first yellow, changing to brown, which is much used for furniture in Ceylon. It somewhat resembles mahogany in colour and appearance, but does not bear great alternations of dryness and moisture, being very brittle when dry. It is, however, suitable for house carpentry in general.

Antiaris toxicaria is the dreadful *Upas Tree* of Java; and although the reports of its exhalations being destructive to the lives of both plants and animals are entirely fabulous, still the juice of the tree is one of the most fearful poisons of the vegetable kingdom. In Java it is called *Antiar* or *Antschar*, and is a large tree upwards of a hundred feet high, with a viscid, bitter, white or yellow juice, which flows in great abundance from incisions made in the bark, and becomes concrete in a black gum-resinous mass on exposure to the air; this is mixed with the seed of *Capsium frutescens* and various aromatics, and forms the poison called by the Javanese *Upas antiar*, which however must not be confounded with *Upas tieute*, another poison of the country taken from the root of *Strychnos tieute*; the word *Upas* signifies vegetable poison. In the neighbouring islands of Macassar and Borneo both of these poisons are called by the name of *Ipo*; for it appears that that of Macassar is the antiar, and that of Borneo the tieute; sometimes the antiar is also called *Bohon-upas*. It seems the preparation of this poison is confined to a few individuals in Java, who make a great mystery about the mode by which it is made; it is of the consistence of molasses, and is preserved in closed tubes of bamboo. *Upas-antiar* is used by the natives to poison their arrows and implements of warfare and hunting; and in consequence of this, before the submission of the island, the Dutch were obliged to protect themselves with a sort of cuirass to preserve them from these deadly weapons.

All animals into the system of which this poison has been introduced by wounds, are seized with violent convulsions and severe evacuations, both upwards and downwards; the brain soon appears to feel the effect of the poison, and the animal dies in a state of tetanus; dogs at the end of an hour, cats in fifteen minutes, monkeys in seven, and the buffalo in two hours and ten minutes. According to the analysis of Pelletier and Caventou, *Upas-antaria* contains an elastic resin having the appearance of caoutchouc, but differing in its qualities; a gummy matter and a bitter substance, soluble in water and alcohol, in which resides the deleterious properties of the juice, and which appears to contain a new vegetable alkali. Strychnin has never been discovered in it. This poison leaves no trace behind it in the bodies of the animals that have died by its action; the blood-vessels

are only filled with a blackish blood, as in asphyxia. Introduced into the veins, death is even far more rapid than when applied by a wound; eight drops injected into the jugular of a horse killed him in a minute and a half in a tetanic state. The flesh of animals killed by this poison may be eaten with impunity. So virulent does this tree appear to be, that even linen made from its fibre, insufficiently prepared, is so acrid as to cause the most distressing itching. From *Antiaris saccidora* sacks are made in Western India, by cutting a branch corresponding to the length and diameter of the sack required; it is soaked a little, and then beaten with clubs till the fibre separates from the wood. This done, the sack formed of the bark is turned inside out, and pulled down till the wood is sawn off, with the exception of a small piece left to form the bottom of the sack. This species, and indeed almost all the others, have none of the virulent properties of the Upas Tree.

The seeds of some of the plants of this family rival chesnuts; those of the Bread-fruit have been already mentioned. The fruit of *Brosimum alicastrum*, a native of Jamaica, are called *Bread-nuts*; roasted or boiled, they are very good to eat in the manner of chesnuts, being farinaceous, agreeably flavoured, and easy of digestion. They furnish a wholesome food for the negroes in times of extreme drought, when other food is scarce. The leaves and young shoots form excellent forage for cattle. The famous *Cow Tree*, or *Palo de Vaca*, is *Galactodendrum utile*. It grows in the Cordilleras and Caraccas, and is a lofty tree, yielding, from incisions made in its trunk, abundant supply of vegetable milk, equal and similar to that obtained from the cow, only it is slightly viscid; it is also different in its composition, more than half of its basis being wax and fibrin, a little sugar, a magnesian salt, and water; and it also approximates that of the Papaya. This juice, or vegetable milk, is not at all acrid, but is wholesome and nourishing, with an agreeable balsamic odour. It is drunk in large quantities by the negroes and natives of the countries where it grows, and they actually become fat on it; they use it also by soaking maize and cassava bread in it. When exposed to the air, this fluid displays on its surface membranes of a highly animal nature, yellowish and thready, like those of cheese, which, when separated from the more watery liquid, are nearly as elastic as those of caoutchouc, but in process of time exhibit the same tendency to putrefaction as gelatine. The tree is found in greatest abundance from Barbula to the lake of Maracaybo. The wood forming the body of the trunk is white, very close-grained, and hard, resembling the box-wood of Europe. *Castilloa elastica*, called *Arbol de Ule*, is a native of Mexico, and yields caoutchouc, as in like manner does *Cecropia peltata*, a native of the West Indies and Brazil. This is called *Trumpet-wood*, or *Snake-wood*. The tree has the trunk and branches hollow everywhere, and sloped from space to space with membranous partitions, answering to so many annual marks in the surface. The fruit is like our raspberry, and is agreeable to eat; it supplies food to the wood-pigeons, who eat it with avidity. The wood is very light, and easily takes fire by friction, hence the Indians take advantage of this and use it for lighting their fires by rubbing it against a piece of harder wood. The small branches, deprived of the membranous partitions in their interior, serve to make wind instruments. Both the trunk and branches yield a great quantity of fixed salt, which is much used among the French to

despumate and granulate their sugars. The bark is strong and fibrous, and frequently used for all kinds of cordage. An infusion of the leaves and young shoots is frequently used against poisoning by *Passiflora quadrangularis*.

ORDER CLXXXVIII.—PLATANACEÆ—PLANES.

By some botanists this family is placed among the amentaceous orders; others, among whom are Richard and Bartling, class it along with the Nettles, and the former suggests that it might easily form a tribe of that family.

Trees or shrubs, with alternate, palmate, stipulate leaves, the base of the footstalks of which completely cover the buds. Flowers unisexual, naked, arranged in the form of round catkins, and the sexes in separate catkins. Stamens single, with scales and appendages mixed among them; anthers two-celled. Ovary one-celled, with a thick, awl-shaped style, having the stigmatic surface on one side; ovules one or two, straight, suspended. Nuts clavate, with a persistent style. Seeds usually solitary, rarely in pairs, pendulous, with a long embryo lying in the axis of thin albumen, and having an inferior radicle.

GENUS.

Platanus, L.

They are all large trees, natives of the Levant, Africa, and North America. *Platanus orientalis*, known in this country by the name of *Oriental Plane*, is one of the most beautiful ornamental trees we have, and highly valuable as being one of very few that flourish under all the disadvantages of the unwholesome atmosphere of large cities. Those who are familiar with London must have observed those stately specimens in Stationers' Hall Court; in the small churchyard in Wood Street, Cheapside; in the neighbourhood of Russell Square, and by the British Museum. Pliny affirms that there is no tree that defends us so well from the heat of the sun in summer, or admits it more kindly in winter. Its wood is sometimes used for cabinet-work, but it is of little value. A peculiarity of this tree is, that it sheds its bark annually, which gives it the appearance as if it had been wantonly injured.

ORDER CLXXXIX.—SCEPACEÆ—SCEPA FAMILY.

TROPICAL trees, natives of India, with alternate leaves, the stipules of which form the scales of the buds. Flowers unisexual, arranged in long

catkins. Perianth with four or five divisions, very minute. Stamens two to five, not elastic; anthers two-celled, opening longitudinally. Ovary two-celled; style wanting; ovules in pairs, collateral, pendulous, anatropal. Fruit capsular, with solitary, arillate seeds.

GENERA AND SYNONYMES.

Scepa, <i>Lindl.</i>	Forestiera, <i>Poir.</i>	„ Borya, <i>W.</i>
Lepidostachys, <i>Wall.</i>	Bigelowia, <i>Sm.</i>	Adelia, <i>L. C. R.</i>
Hymenocardia, <i>Wall.</i>		

The wood of *Lepidostachys Roxburghii*, called in India *Ko-Kra*, is very hard, and is used for various economical purposes.

ORDER CXC.—STILAGINACEÆ—STILAGO FAMILY.

TREES or shrubs, with alternate stipulate leaves. Flowers unisexual, minute, arranged in the form of catkins in axillary, bracteate spikes. Perianth two, three, or five-parted. Stamens two to five, rarely six, inserted in a large fleshy disk; anthers two-lobed, with a fleshy connective, and vertical cells opening transversely. Ovary free, one or two-celled; ovules in pairs, suspended, anatropal. Fruit fleshy. Seed suspended, sometimes penetrated by the processes of the putamen; embryo green, having leafy seed-lobes, and a short superior radicle lying in the axis of copious fleshy albumen.

GENERA AND SYNONYME.

Antidesma, <i>L.</i>	Falconeria, <i>Royle.</i>	Cremostachys, <i>Tul.</i>
Stilago, <i>L.</i>	Stilaginella, <i>Tul.</i>	Bennettia, <i>R. Br.</i>

These are natives of India and Madagascar; some produce fleshy berries, that are esteemed for their grateful acid, rivalling in flavour our Currants and Berberries. The young leaves of *Stilago buniis* are acid, and are cooked with vegetables like sorrel; and they are used for their diaphoretic properties, in syphilitic cachexia. The leaves of *Antidesma alexitaria* are employed in decoction against the bites of venomous serpents; the fruit is considered delicious by the natives of Malabar; from the bark, cables are made. *A. zeylanicum* is celebrated for its alexipharmic properties.

ORDER CXCI.—LACISTEMACEÆ—LACISTEMA FAMILY.

SHRUBS, having alternate, simple, stipulate leaves. Flowers hermaphrodite, or unisexual, arranged in catkins. Perianth minute, deeply four-parted, and having a large bract. Disk fleshy, girding the genitals, some-

times wanting. Stamen one, hypogynous; anthers with a thick, two-lobed connective, on the apex of the lobes of which is placed one cell, opening transversely. Ovary superior, one-celled, with several anatropal ovules, attached to two or three parietal ovule-bearers. Fruit a capsule, one-celled, two or three-valved. Seeds one in each valve by abortion, suspended, arillate, having fleshy albumen, an inverted embryo, with flat seed-lobes, and a superior radicle.

GENERA AND SYNONYMES.

Synzyganthera, *R. & P.*
Didymandra, *W.*

Lacistema, *Swartz.*
Nematospermum, *L. C. R.*

These are natives of woods in tropical America, and are not known to possess any properties.

ORDER CXCH.—PODOSTEMONACEÆ—RIVER-WEEDS.

THESE are floating aquatic herbs, with capillary or minute leaves, often densely imbricated, and having the aspect of Mosses or Liverworts. The flowers are usually hermaphrodite, minute, and rising from a kind of spathe. Perianth sometimes entirely wanting, or in three divisions. Stamens one or many, hypogynous and monadelphous. Ovary two to three-celled, with an axile ovule-bearer, and numerous ascending anatropal ovules. Fruit a two to three-valved capsule. Seeds without albumen, and having an orthotropal embryo.

GENERA AND SYNONYMES.

Hydrostachys <i>Thou.</i>	Cenone, <i>Tul.</i>	Crenias, <i>Sp.</i>	Philoerene, <i>Bory.</i>
Mourera, <i>Aubl.</i>	Apinagia, <i>Tul.</i>	Oserya, <i>Tul.</i>	Terniola, <i>Tul.</i>
Stengelia, <i>Nick.</i>	Lophogyne, <i>Tul.</i>	Devillea, <i>Tul.</i>	Lawia, <i>Griff.</i>
Lacis, <i>Lindl.</i>	Dieræa, <i>Tul.</i>	Sphærothylax,	Dalzellia, <i>Wight.</i>
Lonchostephus, <i>Tul.</i>	Monostylis, <i>Tul.</i>	[<i>Bisch.</i>	Weddelina, <i>Tul.</i>
Marathrum, <i>H. B. K.</i>	Podostemon, <i>Rich.</i>	Castelnavia, <i>Tul.</i>	? Halophila, <i>Thou.</i>
Rhyncholacis, <i>Tul.</i>	Hydrobryum, <i>Tul.</i>	Tristieha, <i>Thouars.</i>	? Lemnopsis, <i>Zipp.</i>
Ligea, <i>Tul.</i>	Mniopsis, <i>Tul.</i>	Dufourea, <i>Bory.</i>	? Diplanthera, <i>Thou.</i>

Natives of North and South America and India. When burned, many of these yield a considerable quantity of salt in their ashes; such are Mourera and Lacis. In New Grenada the cattle feed greedily upon the leaves of *Marathrum utile* and *M. Schiedeianum*; and an excellent fish, called in Guiana Pakou and Coumarou, are said to owe their good quality to their feeding on Mourera and other plants of this family.

ORDER CXCHIII.—CHLORANTHACEÆ—CHLORANTHUS FAMILY.

HERBS, or undershrubs, with jointed stems, opposite, simple leaves, the footstalks of which sheath the stem, interpetiolar stipules, and hermaphro-

dite or diclinous flowers. Flowers naked, having a scaly bract. Stamens definite, lateral, one or more; anthers one to two-celled, with a pendulous, orthotropical ovary. Fruit a berry, unopening. Seed pendulous, with a minute embryo, placed in the apex of fleshy albumen, with no vitellus seed-lobes divaricate; the radicle inferior and remote from the hilum.

GENERA AND SYNONYMES.

Hedyosmum, Swz.	Chloranthus, Swz.	„ Cryphæa, Ham.	Stropha, Noronh.
Tafalla, R. & P.	Nigrina, Th.	Peperidia, Rehb.	Sarcandra, Gardn.
Ascarina, Forst.	Creodus, Lour.		

These are all natives of the hot parts of India, South America, the West Indian and Society Islands. *Chloranthus officinalis* and *C. brachystachys* have an aromatic fragrance which is gradually dissipated in drying, but their roots retain a fragrant, camphorous smell, and an aromatic, somewhat bitter flavour. The mountaineers of Java employ the roots, in infusion, or rubbed up with the bark of *Cinnamomum culilawan*, as a remedy for spasms in pregnant women. Mixed with Anise and Ocymum, they are administered with great success in malignant small-pox in children. An infusion of the dried root is successfully employed in fevers attended with great muscular debility, and a suppression of the functions of the skin. The leaves of *C. inconspicuus* are used in China and Japan for scenting teas; all those teas which have what is called the cowslip flavour are scented with the leaves or berries of this plant; and an infusion of it is taken, in Java, to restore vigour after fevers.

ORDER CXCIH.—SAURURACEÆ.—LIZARD'S-TAILS.

HERBS inhabiting marshy places, having alternate, stipulate leaves, and naked, hermaphrodite, spiked flowers, each supported on a scale. Stamens three to six, club-shaped, hypogynous, persistent; anthers continuous, with a thick fleshy connective, and two lateral lobes, bursting longitudinally. Ovaries three or four, distinct or united, each with a single, ascending, orthotropical ovule. Fruit a drupe, three or four celled, opening at the apex. Seeds with a minute embryo, lying in a fleshy sac on the outside of the apex of hard, mealy albumen.

GENERA AND SYNONYMES.

Saururus, L.	Houttuynia, Th.	Anemiopsis, Hook.	Gymnotheca, Denc.
Mattuschkia Gmel.	Polypara, Lour.	Anemia, Nutt.	

Natives of North America, China, and the North of India. *Saururus cernuus* is acrid, and its root is made into a poultice in North America in pleurisy. The leaves of *Houttuynia* are considered emmenagogue in Cochin China.

ORDER CXCIV.—PIPERACEÆ.—PEPPERS.

HERBACEOUS plants and creeping shrubs. *Leaves* alternate, sometimes



Fig. 205. A, Spike of *Piper nigrum*; B, spike of the fruit; C, part of a spike, natural size; D, a berry; E, section of ditto, showing the embryo sac, or vitellus.

opposite, or in whorls, frequently with a deciduous stipule opposite the leaves that are alternate. *Flowers* unisexual, collected in long, slender, cylindrical spikes or catkins, generally opposite the leaves, and composed of male and female flowers arranged without order and frequently intermixed with scales. The male flowers consist of two or three stamens borne on a scale or bract, and the females of a single pistil. *Stamens* arranged on one side or all round the ovary; anthers two-celled, with or without a fleshy connective. *Ovary* free, simple, one-celled, containing one erect orthotropal ovule; stigmas one, or three. *Fruit* a small berry, free, somewhat succulent, unopening, one-celled and one-seeded. *Seed* erect, with an embryo in the apex of fleshy albumen, and contained in a fleshy sac of mucilaginous matter on the outside of the albumen.

TRIBE 1. *Piperomiæ*.—Herbs or under-shrubs. Leaves generally fleshy, without stipules. Spikes axillary or terminal. Stamens two, with confluent cells. Stigma generally simple.

GENERA AND SYNONYMS.

<i>Verhuellia</i> , <i>Miq.</i>	<i>Acrocarpidium</i> , <i>Miq.</i>	„ <i>Micropiper</i> , <i>Miq.</i>	<i>Dugagelia</i> , <i>Gaud.</i>
<i>Philobryon</i> , <i>Miq.</i>	<i>Piperomia</i> , <i>R. & P.</i>	<i>Tildenia</i> , <i>Miq.</i>	<i>Erasmia</i> , <i>Miq.</i>

TRIBE 2. *Piperæ*.—Trees or shrubs. Leaves alternate, membranous, or leathery, with stipules. Spikes opposite the leaves. Stamens often two; anthers with two distinct cells; stigmas several.

GENERA AND SYNONYMS.

<i>Pothomorphe</i> , <i>Miq.</i>	<i>Cubeba</i> , <i>Miq.</i>	<i>Enekea</i> , <i>Kunth.</i>	<i>Steffensia</i> , <i>Kunth.</i>
<i>Heckeria</i> , <i>Kunth.</i>	<i>Piper</i> , <i>L.</i>	<i>Nematanthera</i> , <i>Miq.</i>	<i>Zippelia</i> , <i>Bl.</i>
<i>Macropiper</i> , <i>Miq.</i>	<i>Muldera</i> , <i>Miq.</i>	<i>Peltobryon</i> , <i>Klotz.</i>	<i>Serronia</i> , <i>Gaull.</i>
<i>Chavica</i> , <i>Miq.</i>	<i>Cocobryon</i> , <i>Klotz.</i>	<i>Spharostachys</i> , <i>Miq.</i>	<i>Ottonia</i> , <i>Sp.</i>
<i>Chavica</i> , <i>Miq.</i>	<i>Callianira</i> , <i>Miq.</i>	<i>Artanthe</i> , <i>Miq.</i>	<i>Carpunya</i> , <i>Prest.</i>
<i>Rhyncholepis</i> , <i>Miq.</i>	<i>Schilleria</i> , <i>Kunth.</i>		

GEOGRAPHICAL DISTRIBUTION.—The Peppers are confined entirely to the tropics, and are most common in America and Asia; in Africa they are very rare, except at the Cape of Good Hope, where several are found.

PROPERTIES AND USES.—These possess acrid, pungent, and aromatic properties, as are exemplified in the Common Pepper used in domestic economy, and this is perhaps the most important product of the whole family.

Black Pepper and *White Pepper* are both the fruit of *Piper nigrum*. White Pepper is the ripe berry deprived of its skin by soaking it in water, rubbing it off, and drying it in the sun. It has less of the peculiar virtues of the spice than Black Pepper, and is not so generally employed. The plant is a native of India, and is cultivated throughout the whole of the tropics, but particularly in Java, Sumatra, Borneo, Malacca, and Hindostan; large quantities are also produced in the tropical regions of the New World. It is a rambling shrub, eight or ten feet in length, and when cultivated requires support in the same way as the vine, either by means of artificial stakes or by planting other trees; those which are used for the purpose are *Diospyros decandra* or *Erythrina corallodendron*. The plant is propagated by cuttings, comes into a bearing state in three or four years after it is planted, and furnishes two crops of fruit in a year for a period of eleven or twelve years. The fruit, the size of a pea, produced in spikes, green at first, then changing to red, and when ripe perfectly black. When ripe, they are spread out on mats to dry, and trodden on to separate them from their spikes. According to the analysis of Pelletier, pepper contains piperin; a very acrid concrete oil, on which the properties of the seed are supposed to depend; a balsamic oil; a gummy colouring matter; extractive analogous to that of the leguminous plants; gallic and tartaric acid; starch; bassorin; lignin, and a small quantity of earthy and alkaline salts. *Piperin* was discovered by Ærstedt, and is in the form of colourless, transparent crystals, and without taste. It has been highly praised by some as a febrifuge, but, by repeated experiments, it seems to have no action whatever on the system. It has been thought by some that this is the active principle of pepper, but that has been already proved to reside in the acrid, concrete oil. Pepper, as is well known, is a warm, carminative stimulant; it strengthens the stomach, assists digestion, and gives tone to the whole system, when employed in moderate quantity. But the inhabitants of the tropics use it to a much greater extent than we do; with it they almost saturate their food, drink it in decoction, make fermented liquors of it, which they take with relish, and which appears necessary in consequence of the excessive heat of the climate, the continual perspiration, and the debility of the digestive functions which such a temperature induces. As a medicine, pepper is chiefly employed to excite languid digestion and correct flatulence; it is the principle ingredient in the well-known medicine called *Ward's Paste*, so celebrated in the cure of chronic piles. *P. triviale*, a native of the Circars, is excessively pungent, and an article of important commerce from Madras; it is used for the same purpose as black pepper, as are also the following American species: *Peltobryon longifolium*; *Serronia jaborandi*, used in Brazil as a panacea against all diseases, but particularly against bites of serpents, and as a sudorific, cordial, sialagogue, and sternutatory. *Cocobryon capense* supplies the uses of the other peppers at the

Cape of Good Hope. *Chavica Roxburghii* is what is known among druggists as *Piper longum*, or *Long Pepper*, the female spikes of which are dried and used for the same purposes as Black Pepper. It is a native of India and the Philippines, Peru and Brazil; on the coast of Coromandel, an infusion with a little honey is prescribed in catarrhal affections, where the lungs are charged with mucus, a remedy worthy the attention of European practitioners for a complaint so general in our own country.

Cubeba officinalis is a native of Java, Penang, and New Guinea, where it grows wild in the woods, and does not appear to be cultivated. It is a shrub with a jointed flexuose stem. The fruit is a round, fleshy berry, shrivelling up when dried like the fruit of black pepper, and is called *Cubebs*. These berries, like all the peppers, have active, warm, and energetic properties, and their odour is stronger and more agreeable than that of ordinary pepper. *Cubebs* are regarded as strengthening to the stomach, an excellent carminative, and a decided sialagogue; they have been highly praised as a remedy against chronic catarrh, running at the nose, humid asthma, and in all cases where it is necessary to give tone to the tissues, particularly to the mucus membrane, and to repress the superabundant secretion to which it is subject when enfeebled; but they have a special direction to the urinary organs. Similar in effect are the fruits of *C. canina* and *C. Wallichii*. *Arctanthe adunca*, a native of Brazil, is reported to have the same virtues; its root is employed as a sialagogue; and *A. elongata* of Pern has similar properties. It is there named *moho moho*, and is found to be a most powerful styptic, and a valuable remedy in diseases of the genitals and rectum. It is much used in South America and Belgium to stop the hemorrhage from small vessels, leech-bites, or cut wounds. *Chavica officinarum*, a native of the Moluccas, where it is called *amalaga*, is used as a remedy against syphilis; and a decoction of *Pothomorpha subpellata* is regarded in Brazil as a most powerful diuretic, capable of even producing diabetes if its use is continued; it is also employed in gonorrhœa and strangury.

Chavica betel grows in India, and particularly in the Moluccas, but it is cultivated all over these countries, and also in the West Indies. It helps to furnish the celebrated masticatory of India, which is made by wrapping slices of the areca nut with a little lime in a leaf of the *Betel*, and this is chewed by the Easterns as tobacco is chewed by the inhabitants of the West. It is a powerful stimulant of the salivary and digestive organs, and gives to the saliva and teeth a red colour, which is supposed to be continued throughout the whole extent of the intestinal canal, to which it communicates strength and tone by its energetic astringency. It is an agent of powerful irritation, which, combined with cold bathing, and particularly friction with cocoa-nut oil, relieves excessive perspiration. Those who use betel are, at the age of twenty-five or thirty, deprived of their teeth, which corrode down to the very gums, but they are never troubled with toothache; it is said that they also escape fevers and dysentery. Those unaccustomed to betel when they first use it become giddy and intoxicated, a painful sensation is produced in the mouth, the tongue is ulcerated, and the nerves are affected in such a manner as almost to deprive them of taste. *C. siriboa* is used in Amboyna for the same purpose, by the name of *Siri*. A similar use is made of the root of *Macropiper methysticum*, by the Islanders of the Pacific.

The plant grows in most of the islands of the Pacific Ocean, and is called *ava*, *cava*, or *kava*, whence the name of *Ava pepper*; in the Caroline islands it is called *shiaka*. The root is the part employed, and from it the natives of these islands prepare a beverage which they drink at their meals; it is distasteful to Europeans, but as wholesome and healthful to those peoples as the betel is to the natives of India. The infusion of this root is at first of a sugary taste, like that of liquorice, but it soon becomes warm and stimulating in the stomach, causing a sort of intoxication or mental excitement. The root is acrid and aromatic, and is also chewed by the natives of those islands. In the Caroline islands the fresh shoots of this plant are soaked along with the roots in water till they become soft, and the liquor is drunk before entering upon any matter of business, or offering sacrifice; but by the influence of the missionaries these practices have been discontinued. Drinking the infusion of *ava* is also used by these people, and particularly in Tahiti, against syphilis; they drink a strong maceration of it, which throws them into a state of intoxication for twenty-four hours, at the end of which copious perspiration takes place, and a repetition of the dose generally removes the disease. *Porthomorpha umbellata* is called *Paratoda* in Brazil, and is used by the natives as a medicine; they mix it with grease, and thus apply it to tumours to disperse them. The root is aromatic, approaching that of pepper, and its flavour is slightly bitter. *Piperomia rotundifolia* is reputed to be vulnerary.

ORDER CXCIV.—GARRYACEÆ—GARRYA FAMILY.

SHRUBS, without concentric zones in the wood, having opposite leaves without stipules. Flowers unisexual, arranged in catkins, and surrounded by bracts. Perianth in the male flowers in four divisions, alternate with the four stamens; in the females adherent, two-toothed. Ovary one-celled; ovules two, suspended from the apex of the cell by two cords as long as themselves; styles two. Fruit a two-seeded berry, unopening. Embryo minute, in the base of fleshy albumen.

GENERA.

Garrya, Douglas.

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Fadyenia, Endl.

These are natives of the temperate regions of North America. They are not known to possess any properties.

ORDER CXCVI.—JUGLANDACEÆ—WALNUTS.

TREES. *Leaves* alternate, compound, unequally pinnate, with entire or serrated leaflets, generally without dots and stipules. *Flowers* unisexual, monœcious, or diœcious; the males arranged in pendent, cylindrical catkins, and composed of an involucre or perianth composed of five or six unequal lobes, containing fourteen to thirty-six stamens, and furnished externally with a scale or bract; the females are solitary, or united two or four together at the summit of a small shoot, and composed of a perianth with four lobes united with the ovary. *Ovary* inferior, two or four-celled at the base, one-celled at the apex; solitary, erect, orthotropal, supported on a short column. *Stigmas* two or four, almost sessile. *Fruit* a fleshy, unopening husk, enclosing a hard-shelled nut, which is one-seeded, four-celled at the base, and one-celled at the apex. *Seed* erect, without albumen, deeply two or four-lobed at the base, where it is partially divided by the partitions, smooth, or twisted and sinuated. *Embryo* with thick, fleshy, oily, twisted, and deeply-furrowed seed-lobes, and a very short superior radicle.



Fig. 206. A, Female flowers of *Juglans regia*; B, section of the ovary of ditto.

GENERA AND SYNONYMES.

Juglans, L.
Carya, Nutt.
Hicorius, Raf.

Pterocarya, Nutt.
Engelhardtia, Lesch.
Pterilema, Reinw.

Dammara, Rumph.
Fortunæa, Lindl.
Platycaarya, Zucc.

GEOGRAPHICAL DISTRIBUTION.—The greatest number are natives of North America. The walnut is originally from Persia; one is found in the Caucasus, a few in India, and one in the West Indies.

PROPERTIES AND USES.—The *Common Walnut* (*Juglans regia*) is a native of Persia, but has been known in this country from an early period; for Turner, who wrote in 1551, says, "it is so well known in all countries that I need not to describe." It has been said that the shade of the walnut-tree is injurious, and causes fevers, and caros or coma, and hence the tree has been called caryon; but although these are exaggerated assertions, it is certain that the strong odour of the walnut causes headache. The sap is abundant, limpid as water, and contains sugar; to obtain this, the tree is tapped in the spring, about two feet from the ground, in the same way as the birch for wine, and the maple in Canada for sugar; and the sap which flows from it is collected in glazed earthen vessels; it is then treated in the same way as the juice of the sugar-cane or beet-root, and a hundred pounds of the juice will yield two pounds and a half of sugar; by fermentation, a very good wine may also be made from it. The leaves of the walnut have a very strong, balsamic aroma, particularly when rubbed or bruised, and have been recommended, in infusion, against the itch, and recently the same infusion has been found highly advantageous

as a cure for scrophula; their juice is employed by the women of Wallachia as a cure for rash in children; the leaves, bruised and rubbed on parts affected with itch, have been found of great service; and mixed with grease, they are said to furnish a pomatum that induces the growth of the hair; put in wardrobes and cabinets, they drive away insects; and a decoction of them sprinkled on lawns kills earthworms, and applied in the same way to gooseberries, destroys the caterpillars with which they are sometimes infested. The inner bark is acrid and vesicant, like that of *J. cinerea*; and it is also said to be emetic.

The fruit of the walnut, in their immature state, and when they are sufficiently soft to permit a pin to penetrate them without resistance from the shell, form an excellent pickle preserved in vinegar, and boiled with sugar they make an equally good confection. When ripe, the kernels are agreeable to eat, being deprived of their pellicle, which is very bitter, but which loses that bitterness in a great degree after the fruit has been kept for some time. They easily become rancid, and are then unwholesome and injurious, causing pyrosis, or water-brash, and heaviness in the stomach. The husk of the fruit, which is green, fleshy, and smooth, is extremely bitter and distinctly astringent, with a particular, strong, and disagreeable odour; the distilled water has been highly praised as a stomachic, and a ratafia and an extract made from them are said to have the same effect; the infusion is anthelmintic. The husks boiled yield a dark, yellowish-brown dye. The kernels contain a great quantity, or nearly half their weight of oil; this oil is white, sweet, and inodorous; it is used in painting, for burning in lamps, and for domestic purposes; in many parts of Germany it is used as a substitute for butter; it soon becomes rancid, and dries quickly. The mass left after the oil is extracted is called "walnut bread," and is eaten by children, poultry, and domestic animals on the continent. The timber is of great value, and is largely used in cabinet-work, and for gun and pistol stocks; before the introduction of mahogany, it was always employed in the manufacture of the most costly furniture.

Juglans cinerea, or *Butter-nut*, grows abundantly in Canada and the United States. Its inner bark is a mild cathartic, operating without pain or irritation, and resembling rhubarb in the property of evacuating without debilitating the alimentary canal. Its leaves, reduced to powder, are used as a vesicatory instead of cantharides. With the fruit of *J. nigra*, bread is made in the United States; those of *Carya olivæformis* are also eatable, and have the flavour of hazel-nuts, and are highly esteemed under the name of *Pacane-nuts*. The fruit of *C. alba*, or *Shell-bark Hickory*, are called *Kisky Thomas Nuts*, and are also much esteemed in America, as are those of *C. tomentosa*, called *Mocker-nuts*. The fruit of *C. amara* (*White Hickory*) is so harsh and bitter, that squirrels and other animals will not feed on them while any other nut is to be found. The kernels of *C. poreina* (*Pig-nut*) are sweet, and serve as food for swine, racoons, and numerous squirrels. The wood of this tree is stronger and better than any other kind of hickory. The Engelhardtias contain a resinous juice. *E. spicata* is a hundred and fifty or two hundred feet high; the wood is hard, heavy, and durable, and is used in Java for cart-wheels, which are cut out of a solid, horizontal section of the trunk.

ORDER CXCVII.—CUPULIFERÆ—MAST-BEARERS.

TREES, or shrubs. *Leaves* alternate, simple, entire, or lobed, furnished with small, free, deciduous stipules. *Flowers* unisexual; the males arranged in long, pendulous, cylindrical catkins, each flower consisting of a simple, three-lobed, or calyx-like scale, on the upper surface of which are six or a greater number of stamens, but without a pistil; the females are generally axillary, sometimes solitary or grouped into heads, and surrounded by a common involucre, which, in the Oak, forms a cup, in the Nut a tubular, laciniated coat, in the Chesnut and Beech a spiny husk, and which in the Hornbeam is leafy and three-lobed. *Perianth* adherent to the ovary. *Ovary* inferior, crowned by the rudiments of the adherent perianth, and seated in the involucre; two, three, or rarely six-celled, with one or two collateral, pendulous, anatropal ovules; *style* short, terminated by two or three stigmas. *Fruit* solitary, unopening, consisting of a bony, or leathery, one-celled nut, one-seeded by abortion, always accompanied with the cupule or involucre, which sometimes contains several nuts, as in the chesnut and beech. *Seed* with a very large, orthotropal embryo, without albumen, having plano-convex, fleshy seedlobes, and a minute superior radicle.



Fig. 207. A, Catkin of *Carpinus betulus*; B, male flower of *Corylus avellana*; C, section of the ovary of ditto; D, ovary, with the involucre opened to show the adherent perianth.

GENERA AND SYNONYMS.

the adherent perianth.		<i>Carpinus</i> , <i>L.</i>		<i>Ostrya</i> , <i>Scop.</i>
		<i>Distegocarpus</i> , <i>Zucc.</i>		<i>Corylus</i> , <i>L.</i>
<i>Nothofagus</i> , <i>Bl.</i>		<i>Calusparassus</i> ,		<i>Lithocarpus</i> , <i>Bl.</i>
<i>Fagus</i> , <i>L.</i>		[<i>H.</i> & <i>J.</i>]		<i>Quereus</i> , <i>L.</i>
<i>Calucechinus</i> ,		<i>Castanea</i> , <i>Gärt.</i>		<i>Callæocarpus</i> , <i>Miq.</i>
[<i>H.</i> & <i>J.</i>]				<i>Suber</i> , <i>T.</i>

GEOGRAPHICAL DISTRIBUTION.—These are distributed most abundantly throughout the northern hemisphere, and particularly in the New World; several are found at high altitudes between the tropics, and some are met with at the southern extremity of South America, in Van Dieman's Land, and New Zealand; but in Chili and Barbary they are rare, while at the Cape of Good Hope they are wholly unknown.

PROPERTIES AND USES.—The bark of some is bitter and very astringent, and many of the fruits present the same peculiarity. The fruits of others are farinaceous, sweet, and agreeably flavoured, in some cases containing one-half their weight of oil.

The *Hazel Nut* (*Corylus avellana*) is a tree well known in this country,

both for its fruit and wood. The former is gathered by children, but, being small, are not so esteemed in the dessert as the better variety, called the *filbert*. Hazel nuts are little inferior in flavour to almonds, and they yield about half their weight of oil, which is called *nut-oil*. This has drying properties, and is much used by painters; it is also employed by druggists as the basis of fragrant oils, and it has been found serviceable in coughs. The tree is extensively grown in some parts of England for coppice-wood; in Sussex and Kent it is much used for this purpose, the rods being employed for making hoops, and the large wood for charcoal. The charcoal is in great request for forges, and it is that which is used by artists for drawing their outlines. The roots are used by cabinet-makers for ventering, and in Italy the chips of hazel are sometimes put into turbid wine for the purpose of fining it. Hazel rods have been supposed to have magical properties, as it was of them that the *divining rod* was formed. This is either a single curved rod, or forked. The rod is held in a particular way, and if it leans towards one side, those who use it believe it to be an indication that water, or metals, or treasure is near. From the wood an empyreumatic oil is extracted, which is vermifuge, and acts as a cure for toothache. The long, beak-like involucres of *C. rostrata* have been employed in the United States as an anthelmintic, in the same way as cowhage.

The *Beech* is one of the stateliest of our forest trees, rivalling the oak in its magnitude and outline. The wood is extensively used by cabinet-makers and turners; by the former for chairs, bedsteads, and tables, and by the latter for wooden bowls, ladles, butchers' trays, shaving-boxes, and other articles of domestic use. At Berkhamstead, in Hertfordshire, a great part of this turnery-ware is made, and the manufacture gives employment to great numbers of the population, both in the town and surrounding country. The wood is also used by the cartwright, wheelwright, and coachbuilder; but for building purposes, or wherever durability is required, it is of little value. It is said that the durability is increased by soaking it for some time in water before using; and there is an instance related by Ellis of Gaddesden where he saw a beechen floor that lasted as well as oak for sixty years, by the boards being first soaked in water, and afterwards smoked in a chimney before they were laid. The wood of the beech is superior to that of most other trees as fuel, and the green wood is generally preferred to that which is dry, as it burns slower, though it does not give out so much heat; burned green, it produces light and heat relative to dry wood as 1181 is to 1540. It affords a great quantity of alkali, and makes excellent charcoal; the ashes contain 11.72 of carbonate of potash; 12.37 carbonate of soda; 3.49 sulphate of potash; 49.54 carbonate of lime; 7.74 magnesia; 3.32 phosphate of lime; 2.92 phosphate of magnesia; 0.76 phosphate of iron; 1.51 phosphate of alumina; 1.50 phosphate of manganese; and 2.46 of silica. The leaves, gathered in autumn, before they are injured by frost, make excellent mattresses; and the male catkins, carefully collected and dried, are as soft as silk, and serve well for packing fruit, as they do not communicate any flavour to it, as many packing materials do. The fruit of the beech, called beech-mast, has been long known as a nutritious food to some animals, and particularly to hogs, who are rapidly fattened on it. They are also sometimes eaten by man, but in large quantities they are highly injurious, there being instances on record where giddiness, delirium,

and even convulsions have followed an excessive use of them. What the active principle is we do not at present know, and we are not aware that any correct analysis of the mast has ever been made; they have the same injurious effect on horses, and many instances are mentioned by German veterinarians of horses having been poisoned by the use of them. Nevertheless, this deliterious principle, which some have supposed to be hydrocyanic acid, seems to be volatile, and capable of being dissipated by heat, because, in some parts of the continent where beech forests exist, the fruit is dried, reduced to powder, and converted into a wholesome bread. The fruit yields a great quantity of oil, called *Beech Oil*, useful for all domestic purposes, and quite equal in flavour and delicacy to olive oil, and has the further advantage of keeping longer sweet. In the year 1714 the celebrated Aaron Hill obtained a patent for the manufacture of beech oil, which was to be carried on by a company, and by which, according to the calculations of the projector, large fortunes were to be realised; but the scheme proved a failure. The book he wrote on the subject, now rare, is very interesting, and contains much amusing information. The oil is used by the inhabitants of Silesia as a substitute for butter; and it is extensively prepared in the forest of Compiègne in France, the mare left after the oil is expressed being given as food to poultry, swine, and cattle; but a distemper called garget is apt to be engendered in swine by the too great use of the fruit. The husks, or involucre of the fruit, yield a narcotic extractive called *fagin*; and starch is found in the seed-lobes in considerable quantity.

The *Chesnut* (*Castanea vesca*) is supposed to be a native of Asia Minor, and to have been cultivated in all parts of Europe from time immemorial, and its fruit forming, in some parts of the continent, an important article of food, would be a strong encouragement to the extension of its cultivation. The tree attains a great size, acquiring from sixty to eighty feet in fifty or sixty years; but unlike the oak, which becomes more valuable as a timber tree the older it becomes, the chesnut decreases in value, on account of the timber decaying at the heart, becoming brittle, and only fit for fuel; it has the property of being more durable when young, the sapwood being early converted into heartwood, and hence the great value of this tree for posts, fencing-poles, stakes, and hop-poles, for which purpose it is very much grown as coppice-wood in Kent and Sussex. There are many instances of the great size and longevity of this tree, and the most remarkable of these are the great chesnut of Tortworth Park, in Gloucestershire, and that of Mount Etna, in Sicily. The former is said to have existed in the reign of King John, and even in King Stephen's time to have been called "the great chesnut." It was 56 feet in circumference of the trunk, at six feet above the ground. The chesnut of Mount Etna, as measured by Brydone, was 204 feet in circumference of the trunk. There is much similarity between the timber of the chesnut and the oak, and hence differences of opinion have arisen as to the material of which some old structures are composed. Such is the case with regard to the roof of Westminster Hall, formerly thought to be of oak, but now ascertained with considerable accuracy to have been constructed of chesnut. These two woods are distinguished from each other by the transverse fibres of the chesnut being more confused than those in the oak, and much less perceptible to the naked eye, more especially in a newly-cut section; so that, to ascertain whether timber

is oak or chesnut, it is only necessary to saw off a thin slice from one of its extremities. The wood makes excellent staves for casks, as they do not shrink, and neither do they communicate a colouring matter to the contents. The fruit of the chesnut forms a wholesome and nutritious food to the inhabitants of many districts in Europe, particularly to mountaineers; it even takes the place of wheat in those elevated regions where that cereal cannot be grown, as in Auvergne, Limousin, and Vivarais, where, during several months of the year, they are eaten either steamed, boiled, or roasted; and they are kiln-dried, so as to admit of being kept for a period of two or three years, in the event of scarcity. Ground and reduced to powder, they form excellent bread, and highly washed they make a good substitute for chocolate. Domesticated animals eat and fatten on them rapidly, and the flesh so formed is juicy and highly flavoured. Sugar and starch have both been extracted from the fruit. The inner bark is said to be useful against dysentery. The bark is used for tanning, but is not so valuable for that purpose as the oak, and only sells for half the price.

The various species of oak are remarkable for their powerfully astringent properties, for the colouring matters they contain, and for their various other uses in the arts, manufactures, medicine, and domestic economy. The *Common Oak* (*Quercus pedunculata*) is that which is met with so plentifully in this country; but there is also another species called *Red Oak*, *Chesnut Oak*, or *Durmast* (*Q. sessiliflora*). The former is distinguished by having no footstalks to its leaves, and by its fruit being borne on long stalks; the latter by its leaves having footstalks sometimes nearly an inch long, and by its fruit being seated close on the branch without any stalk at all. The latter is not nearly so common as the former, but there are parts of the country where it is found in considerable quantity. As these two species closely resemble each other in their properties, products, and uses, we shall not consider them apart, but regard the observations about to be made as referable to both, with this important exception, that the timber of *Q. sessiliflora* is infinitely inferior to that of *Q. pedunculata*, being considerably softer and less durable.

The wood of the oak is harder and more solid than that of any other European timber tree, and, as is well known, is largely employed in ship-building, carpentry, waggon work, cabinet making, mill work, and coopering. The bark is of great utility, as furnishing in greatest abundance the article known as *tan* for tanning hides and skins, and this property is owing to the presence of a great quantity of tannic acid; it also contains a peculiar bitter principle, known by the name of *quercin*; after the bark has been used in the tanyard, it is employed for making hotbeds in forcing-houses. Acorns, or the fruit of the oak, are highly nutritious to various animals, but particularly to hogs, which rapidly fatten on them; and it has been observed that those are best for the purpose that have been washed and dried by exposure to the air. In Turkey the acorns of several sorts of oak are buried in the ground, in the same way as cacao beans are, to deprive them of their bitterness; they are then dried, washed, and reduced to powder with sugar and aromatics; the substance thus formed is called *palamonte*, and the food that is prepared from it is called *racahout*, and is used in the seraglios to fatten and keep up the embonpoint of the sultanas. In some parts of Europe acorns are said to be converted into bread. By analysis they have

been found to contain in 1,000 parts, fixed oil, 43; resin, 52; gum, 64; tannin, 90; bitter extractive, 52; starch, 385; lignin, 319; and traces of potash, lime, alumina, and some earthly salts; by which it will be seen that they contain more than a third of nutritive matter, and that consequently they are capable of being taken as food, particularly when they have been deprived of their resinous and extractive matters. In Italy the oil is extracted and applied to burning in lamps, but it does not appear that much attention has been given to this branch of industry. It is stated by Dr. Barras that he found the infusion of roasted acorns, sweetened with sugar, of great advantage in promoting digestion, if taken in the same way as coffee, after meals; and that he has seen dyspepsia, and even disordered stomach, cured by the use of them; the acorns and the cup have been found useful as an astringent in mucous diarrhœa. The acorns of *Q. esculus*, or *Italian Oak*, have somewhat prickly cups, and are long, slender, and esculent, and may in times of scarcity be ground into flour and made into bread. The tree is a native of Spain, Italy, and the south of Europe, and is supposed to be the true Phagus of the Greeks, and the Esculus of Pliny.

Quercus cægilops is called *Valonia Oak*, because its cups and acorns furnish the article *Valonia*, so much used in the arts for tanning and dyeing. The tree grows abundantly in the Levant, whence the great supplies of *Valonia* are imported. The acorns are very large and short, set in a large mossy cup; and the two together form the *Valonia* of commerce, which is said to contain more tannin, in a given bulk of substance, than any other vegetable. *Q. infectoria* is a small shrub, growing abundantly in Asia Minor. It is on the young shoots of this shrub that the *gall-nuts* of commerce are produced. They are caused by a small insect, *Diplolepis gallætorix*, the female of which punctures the young growing shoots and therein deposits its eggs, which occasions an extravasation of the sap and a cellular swelling of the part, which continues to increase in size. The egg in course of time produces a larva, which lives upon the interior of the gall, until, being transformed into a fly, it eats its way out by a small round hole, as may be sometimes seen in galls. But to have galls in the highest perfection, they should be gathered before the egg is hatched or the fly has escaped; at this period they are of a dark colour, and are hence called blue, green, or black galls; but if allowed to remain longer, they lose their dark colour, and are then called white galls. Galls are powerfully astringent, and are employed in medicine and in the arts; they form an important ingredient in the making of writing-ink, and are employed as an internal remedy in chronic diarrhœa and chronic dysentery; and also as an astringent gargle; formed into an ointment, they serve as a useful external application to hemorrhoidal affections. By analysis, galls contain 65 per cent. of tannic acid; 10.5 of lignin; 5.8 of gum, sugar, and starch; 4.0 of gallic, ellagic, and luteo-gallic acids, and 11.5 of water, besides extractive chlorophylle, volatile oil, albumen, and salts. A decoction of the bark of *Q. falcata* is used, in the United States, as an external remedy against gangrene. *Q. tinctoria* is a native of the United States, where it is called *Black Oak*, and forms one of the largest trees, eighty or ninety feet high. Large quantities of the bark are imported to this country under the name of *Quercitron*, and is used for dyeing wool and silk of a yellow colour. The colouring principle is called *quercitrin*, or *quercitric acid*.

The *Evergreen Oak* (*Quercus ilex*) is a native of the south of Europe and north of Africa, where it frequently attains large dimensions, as it sometimes does even in our own country. The bark is very astringent, and is employed in those countries where the tree is indigenous for tanning hides; the wood is very hard, compact, heavy, and durable, and is used for making pulleys, axles, screws, millwork, and other such appliances which are subjected to much friction. The acorns are sweet and good to eat, particularly those of a variety that grows in warm soils in some parts of Greece and Spain. The acorns of *Q. ballota*, a native of Morocco and Algiers, are quite sweet, and are eaten as an article of food. The *Cork Oak* (*Q. suber*) is a native of the south of Europe and north of Africa, and is a good-sized tree, acquiring the height of twenty to sixty feet, with a trunk sometimes three feet in diameter. It is the elastic fungus-like substance, growing on the outside of the bark of this tree, that is called *cork*. This substance is an unusual development of the corky envelop, or sub-epidermoid tissue of the bark, a cellular organization deposited in successive layers every year, and the oldest is forced outwards to the surface, by the new layers formed beneath them. The tree is cultivated; and it is generally twenty or twenty-five years old before it yields a gathering of cork. The first produce is of little value, and of no use for corks; it is removed simply that the next production may be better, for every successive formation is superior in quality and value to that which preceded it, and it is not till the third gathering that really good cork is obtained; these operations are repeated at intervals of every ten years, and a tree will yield eight or ten of such gatherings. It is quite a mistake to suppose, as some do, that it is the *bark* of this species of oak that is removed for cork; it is merely, as has been stated, the excessive development of the corky envelope, which is in reality an effort of the tree to rid itself of so much excrement or useless matter, the removal of which contributes to its vigour and healthy condition. It is collected by cutting it with a knife at certain distances in a perpendicular direction, and making two cuts across these horizontally, one near the top and another near the bottom; it is then cut off with a curved knife, with a handle at each end, such as coopers use. After they are removed the pieces are soaked in water, and when nearly dry placed over a coal fire, which blackens their external surface, by which operation they are rendered smooth, and all blemishes concealed; the larger holes are filled up with a mixture of soot and soil, after this they are piled one upon another, loaded with weights to make them flat, when they are packed in bales. Among the components of cork the most important is a particular substance called *suberin*, a light, soft, spongy, insoluble, vegetable principle, found in greatest abundance in the cork oak, and which, in combination with nitric acid, forms *suberic acid*. By analysis, M. Chevreul showed that cork is composed of a volatile oil, acetic acid, a yellow colouring principle, an astringent principle, animalized matter, gallic acid, another acid, gallate of iron, chalk, a matter analogous to wax, but crystallizable, called *cerin*; and two other matters appearing to contain cerin, united with undetermined principles. The uses of cork are too well known to require enumeration; but it may not be generally known that the *Spanish black*, used by painters, is simply cork, burned in close vessels. Other vegetable substances have been used for corks such as the root of *Nyssa aquatica*, the

wood of *Cochlospermum gossypium*, and the barks of *Cissus mappia* and *Gastonia spongiosa*.

Quercus, coccifera is a small evergreen shrub, about five feet high when fully grown, more resembling a holly than an oak; it inhabits the south of Europe, the Levant, and north of Africa, and is called the *Kermes Oak*. The young shoots of this shrub are attacked by the insect *Coccus ilicis*, the female of which fixes itself to them, and there remains in an immovable state, living, growing, reproducing by the deposition of eggs, and dying. After death nothing of the insect remains but a reddish shell, filled with a red juice partaking both of an animal and vegetable nature, and containing the eggs. This shell increases in size till it is as large as a pea, and when it has acquired this size, and before the eggs are hatched, they are gathered, thrown into vinegar, and afterwards dried in the sun or in an oven; these form what is known in commerce as *Kermes*, or *scarlet grain*. This is employed in dyeing as a substitute for cochineal, for colouring syrups, and other such purposes. The leaves of *Q. mannifera*, a native of Koordistan, secrete in warm weather a saccharine matter, which is there made use of in sweetmeats. *Lithocarpus javanensis* produces timber so extremely hard as to be called *Stone Oak*.



Acorn of *Quercus infectoria*.

ORDER CXCVIII.—BETULACEÆ.—THE BIRCHES.

TREES and shrubs. *Leaves* simple, alternate, with two small, deciduous stipules. *Flowers* unisexual, arranged in pendulous, sealy catkins; in the males two or three naked flowers are placed on a scale, which has sometimes three or four deep divisions, and resembles a calyx; in the females from one to three sessile, naked flowers, are placed on the internal base of each scale. *Stamens* variable in number in each flower, distinct, and opposite the scales; *anthers* two-celled. *Ovary* free, sessile, compressed, two-celled; *ovules* solitary, suspended from the apex of the cell, anatropal; *stigmas* two. *Fruit* a sort of sealy cone, the scales of which have one or two small, one-celled, one-seeded nuts at their base. *Seeds* with a membranous margin, and without albumen; *embryo* straight, with flat seed-lobes, and a superior radicle.



Fig. 208. A, Section of the pistil of *Betula fruticosa*; B, section of the fruit of ditto.

GENERA AND SYNONYMES.

Betula, L.
Pterocaryon, Spach.
Apteroecaryon, Spach.
Betulaster, Spach.

Alnus, L.
Alnaster, Spach.
Clethropsis, Spach.

GEOGRAPHICAL DISTRIBUTION.—Inhabitants of the temperate and frigid regions of both northern and southern hemispheres, but most abundant in the northern. Some are found on high altitudes in Peru and Columbia.

PROPERTIES AND USES.—The *Common Birch* (*Betula alba*) is essentially a tree of northern latitudes, where it reaches even to the verge of perpetual snow; when found much to the south it is always at high elevations on the mountains. It has been called "the queen of the forest," and if beauty of outline and elegance of form contribute at all to that epithet, none could have a juster claim. It grows in great abundance in the Highland glens of Scotland, clothing the sides of inaccessible ravines, and perfuming the air with their fragrance. To the Highlanders and to the inhabitants of Northern Europe the birch-tree is of great importance. With us the timber is of little value, and the birch is not regarded as of any consideration as a forest tree, its principal uses being in turnery for dishes, bowls, ladles, and other domestic utensils; ox-yokes, small serews, paniers, brooms, wands, bavin-bands, and withs for faggots; it also furnished the arrows, bolts, and shafts of our old British artillery, and the slender twigs are familiar to the minds of disobedient children. But to the inhabitants of Northern Europe it supplies many wants. The timber employed in building their houses, and the rude implements of husbandry are of birch; and it is the only screen or shelter of the arable plots of ground from the piercing blasts that sweep the mountains and glens. It supplies them with fuel, and is the material of which their furniture and domestic utensils are made, such

as spoons, ladles, bowls, boxes, and sandals. The Highlanders use the bark to tan leather and to make ropes; the outer rind they sometimes burn instead of candles; with the fragments of it, dexterously plaited, the Laplanders make shoes and baskets, and large, thick, expanded pieces, with a hole in the middle for the head to come through, they use instead of an umbrella, to keep the rain off. In Russia, Poland, and Norway they cover the roofs of their houses with it, laying turf three or four inches thick over. The leaves serve as a fodder for sheep and goats, and they yield a yellow dye.

The outer bark of the birch is very thick, and peels off in thin silvery layers; these layers, particularly the interior ones, contain a sort of resin, having a peculiar odour resembling guaiacum, and it is this that gives the fragrance to the birch-tree, particularly after rain. The bark burns like the essence of turpentine, with a vivid durable flame, which appears to proceed from the abundance of this resin, and leaves a black residue similar to that of the resin of pines. The analysis of the bark shows it to contain, in 400 parts, 186 of resin; 45 of extractive; 92 of a peculiar principle called *betulin*, which is ranked among the sub-resins; 22 of tannic and gallic acid; 8 of alumina; 18 of oxide of iron; 15 of silica; 10 of carbonate of lime; and 5 of loss. The resinous substance is extracted from the bark, by distillation, in the form of an empyreumatic oil having a particular odour, and with which Russia leather is prepared, giving it a suppleness, durability, and odour which are well known. Pallas states that "the oil is prepared from the white bark, either taken from the living tree or collected from those that are decayed in the woods. It is best made from the latter, because by the putrefaction it is freed from the inner bark, and the external white bark remains uncorrupted for ages, as appears by the old burial-places at Jamaica, and the vaults at the very ancient castle of Moscow, which I observed were covered with birch bark. The bark is gathered into a heap and pressed into pits, made in the shape of a funnel, prepared in a clay soil, and when set on fire it is covered with turf. The oil, distilling through the clay hole at the bottom of the funnel, drops into a vessel placed to receive it, and it is then tunned into casks made of the hollowed trunks of trees. The pure liquid oil swims at top, and is in the greatest request for anointing leather, on account of its antiseptic quality." The oil is a powerful vermifuge, and is used in Lithuania and Courland for curing itch and destroying vermin in cattle. The inner bark is bitter and astringent, and has been used in intermittent fevers by the Russian peasantry. The Laplanders make an ointment with the thin layers of bark mixed with the resin Silver Fir, which serves as a resolvent. In Kamstchatka, Gmelin says, they cut the green bark of the birch and eat it with their caviare. The leaves have a peculiar, aromatic, agreeable odour, and a bitter taste; they have been employed in the form of infusion, in gout, rheumatism, dropsy, and cutaneous diseases. The same complaints, particularly dropsy, are said to be successfully treated by enveloping the body in fresh leaves, which, thus applied, excite perspiration. From the middle of March to the middle of May, a great quantity of juice may be drawn from the birch by boring a hole in the trunk and inserting a tube in the same way as has been described when treating of the Maple. This sap is sweet and agreeable, and in some parts is drunk by the country people; it is regarded as a

remedy for stone in the kidneys and bladder, and even furnishes a certain quantity of sugar. By fermentation, an excellent wine is frequently made in this country from the sap of the birch, and it may even be converted to vinegar.

Betula papyracea, or *Paper Birch*, is a native of North America, where it grows abundantly throughout all the northern States and Canada. It produces hard and very durable wood of a beautiful grain, and is sometimes used for inlaying. Its bark is so durable as to remain entire after the wood has rotted away, and it is employed in covering log houses, in making hats, boxes, and cases, and for placing inside of boots and shoes to prevent the access of moisture. With it the North American Indians make their canoes, and hence it is also called *Canoe Birch*. They select some of the largest trees, and remove the bark in long wide strips; these pieces are sewed together over a light wooden frame-work with the root fibres of the white spruce, and made water-tight along their seams with the resin of the Balm of Gilead Fir; a canoe of this kind weighs only about forty or fifty pounds, and will carry four persons and their baggage. *B. lenta*, called *Sweet Birch*, *Cherry Birch*, and *Mountain Mahogany*, is also a native of North America, and furnishes the wood known among carpenters and cabinet-makers, as *American Birch*. The wood has a fine, close grain, and receives a very high polish; it is principally employed in making chairs, sofas, and other articles of furniture; for the frames of coach-panels, and other purposes. The bark and leaves have a remarkable, aromatic flavour, with the odour and taste of *Gaultheria procumbens*, and they are sometimes used in infusion as a gently stimulating and diaphoretic drink. An oil is obtained from the distillation of the bark, which has been found to be identical with the oil of *Gaultheria*. Both this species and *B. nigra* (*Black Birch*) supply sugar from their sap. The fruit of *B. nana*, or *Dwarf Birch*, is said to be the favourite food of the ptarmigan.

Common Alder (*Alnus glutinosa*) generally grows in moist places, and delights in the banks of rivers or low marshy situations. It is a beautiful tree, sometimes attaining a great size, and contributes an important feature in the flat, pastoral scenery of an English landscape. The wood is well adapted for piles under water, or in moist situations, where it becomes very hard and durable. It was formerly much employed for water-pipes, pump-trees, and for conduits to reservoirs; it is often used in turnery, sculpture, and cabinet-making; for making wooden vessels, bowls, platters, and kneading-troughs; and on the continent, for wooden shoes, soles to shoes and pattens, clogs, and similar purposes. Charcoal made of its timber has been long valued in the manufacture of gunpowder. The Highlanders dye their yarn of a black colour by boiling it with the bark, mixed with copperas; the Laplanders tinge their leathern garments red with saliva after masticating the inner bark. The Koreki, a nation inhabiting the borders of Russia, dye their deer and dog skins for clothing, with alder bark reduced to a fine powder. They sew up the skin in the form of a bag, turning the hairy side outwards, and into this bag they pour a strong decoction of alder bark, leaving it in this situation for some days. Both bark and leaves have been used for tanning skins; they are very astringent and somewhat bitter; the former has been used in intermittent fever, and the latter as a topical remedy in wounds and ulcers. The bruised leaves are sometimes applied

to the breast for the purpose of repelling the milk. The cones also are said to be astringent, and to form a useful gargle in complaints of the throat.

ORDER CXCIX.—BALSAMIFLUE—LIQUIDAMBERS.

TREES, with alternate, palmately-lobed leaves, and deciduous stipules. Flowers unisexual, arranged in round heads or catkins, naked. Anthers indefinite in number, nearly sessile, intermixed with scales. Ovaries two-celled, collected into a round mass, each with a few scales; styles two; ovules numerous, amphitropal. Fruit consisting of two-celled capsules, enclosed in scales, and forming a sort of cone. Seeds winged, with little albumen. Embryo inverted, with leafy seed-lobes, and a short superior radicle.

GENUS AND SYNONYME.

Liquidamber, L.
Altingia, Nor.

These are found in tropical India, North America, and the Levant, and several of them yield a resinous substance. *Liquidamber styraciflua*, a native of Mexico and some of the United States, yields, by incision of the bark, a liquid balsam, called *liquidamber*, or *copalm balsam*, sometimes, but erroneously, named liquid storax. It is thick, of the consistence of honey, more or less transparent, having a sweet, balsamic odour of benzoic acid, and a bitter, acrid, and warm taste. It possesses the same properties as other balsams; being an excitant of the mucous system, it is given in chronic catarrhal affections of the lungs, intestines, and urinary passages, and it is cordial, stomachic, diaphoretic, and diuretic. It is much employed in perfumery, particularly the oil or essence. Another product is obtained from the tree by boiling the young branches, and skimming off the matter which floats to the surface; this, of a dark colour, nearly opaque, is called *black copalm*, and is, like the former, sold under the name of liquid storax. *L. orientale*, growing in the Levant, is supposed to yield the true *liquid storax*; but on this subject there is a diversity of opinion, some supposing that substance to be obtained by pressure from the branches of *Styrax officinale*. *L. altingia* is said to exude a balsam in the Tenasserim provinces of India, bearing some resemblance to liquid storax; it is a lofty tree, 150 to 200 feet high, with a close-grained, heavy, and fragrant wood.

ORDER CC.—SALICACEÆ.—WILLOWS.

TREES, or shrubs. *Leaves* alternate, simple, furnished with deciduous stipules. *Flowers* unisexual, arranged in oval or cylindrical, pendulous catkins; the males composed of one to twenty stamens,

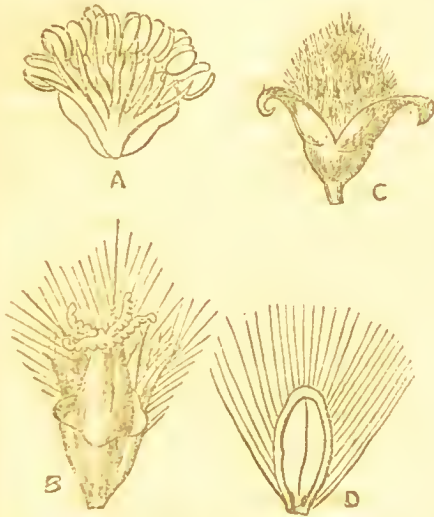


Fig. 209. A, Male flower of *Populus tremula*; B, female ditto; C, ripe capsule; D, section of ditto.

placed in the axil of a scale, or on its superior surface, girded by a disk of one or two glands, or in the form of a eupule; the females consist of a spindle-shaped pistil, situated in the axil of a scale, and sometimes accompanied at the base with a perianth, in the form of a eupule. *Stamens* distinct, or all united together; *anthers* two-celled. *Ovary* free, one-celled, containing numerous, erect, anatropal ovules, adhering to the base of the cell, or to the lower part of its sides. *Stigmas* two, two-cleft. *Fruit* a small, many-seeded capsule, one-celled, two-valved. *Seeds* small, furnished with long, silken hairs, arising from the micropyle; *embryo* erect, with plano-convex

seed-lobes, and a very short, inferior radicle.

GENERA.

Salix, L.

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Populus, L.

GEOGRAPHICAL DISTRIBUTION.—Found for the most part in the northern hemisphere, where they extend to the extreme limits of vegetation. A few are found in Africa.

PROPERTIES AND USES.—Their bark is astringent, and bitter. The leaves of some yield a substance similar to manna, and they are all highly valuable as timber trees.

The species of Willows are very numerous, and they are generally distinguished in this country as Willows, Sallows, and Osiers. Willows are those species with smooth leaves, that attain the dimensions of timber trees; Sallows are those with downy or woolly obovate or rounded leaves, with thick early silken catkins, and prominent, yellow, distinct stamens; Osiers have smooth leaves like the willows, but are of a low, bushy growth, never attaining the dimensions of timber trees, and are generally used for basket and wicker work.

The *Common White*, or *Huntingdon Willow* (*Salix alba*), is found all over Europe and the north of Asia, and grows plentifully in Great Britain. It is a large tree, from fifty to eighty feet high. The timber is very

valuable, and, though light and soft, is remarkably durable, particularly in wet or damp situations. It is very tough, and makes an excellent lining for stone carts and barrows. It is used in turnery, mill-work, coopery, and weather boarding. The bark is used for tanning leather, and for dyeing yarn of a cinnamon colour; and the leaves and young shoots are given to cattle in a green state, or dried and laid up for winter fodder. The inner bark, like that of the Scotch Pine, being kiln-dried and ground into a fine flour, is mixed with oatmeal and made into bread, in seasons of great scarcity, by the inhabitants of Norway and Kamtschatka. The bark of the White Willow has been highly spoken of as an excellent febrifuge, equal, if not superior, to that of cinchona; and although all that has been said of it must be received with caution, there is no doubt that it is a valuable and active agent. The bark is tonic and astringent, and has the same properties of arresting intermittents as Peruvian bark; these properties are owing to the presence of a peculiar crystallent principle, called *salicin*, which is in the form of white, shining, slender crystals, inodorous, but very bitter, and with the peculiar flavour of the bark. It is generally administered in doses of two to eight grains, to be so repeated that twenty or thirty grains may be taken daily. The bark has been found to consist of tannin, resin, a bitter yellow colouring matter, a green fatty matter, gum, wax, lignin, and an organic acid combined with magnesia. The same properties that are met with in this species are also found in *S. fragilis*, *S. pentandra*, *S. Russeliana*, *S. vitellina*, and *S. helix*.

The bark of some species of Poplar is possessed of tonic properties, and is used in intermittent fever with advantage; of these, *Populus tremula* has them in a marked degree. The bark is very bitter, and Pallas states that in Siberia its ashes, which are very alkaline, are mixed in water, and drunk evening and morning in syphilis and scorbutic affections. Submitted to analysis, Braconnot found it to contain salicin, corticin, populin, benzoic acid, a gummy matter, pectic acid, and tartrates. *P. tremuloides*, a native of the United States, is also used as a febrifuge, stomachic, and tonic; it contains populin. *Populin* is a very light, pure, white substance, with a bitter sweetish taste analogous to that of liquorice. The resinous substance found on the buds of *P. nigra* forms, with lard, an ointment applicable to tumours, wounds, and burns; and the alcoholic tincture is useful in pulmonary consumption and rheumatism. That found on the buds of *P. balsamifera* has been compared to the balm of Mecca. The Russians on the banks of the Irkutz infuse the young shoots of this tree in alcohol, which they distil, and obtain from it a liquor with an agreeable taste, which they esteem as a diuretic, and employ in scurvy and dysuria.

ORDER CCI.—MYRICACEÆ—SWEET-GALES.

TREES or shrubs, with resinous glands, alternate leaves, and naked, unisexual flowers, arranged in catkins. Stamens two to eight, usually in the axil of a scale; anthers two to four-celled. Ovary one-celled, sur-

rounded with several hypogynous scales; ovule solitary, erect, orthotropical; stigmas two. Fruit drupaceous, often covered with wax, and with adherent fleshy scales. Seed solitary, erect, without albumen; embryo with plano-convex seed-lobes, and a short superior radicle.

GENERA AND SYNONYME.

Myrica, *L.*
Gale, *T.*

Comptonia, *Banks.*
Clarisia, *R. & P.*

These are aromatic trees or shrubs, growing in temperate and tropical countries. *Myrica gale*, or *Sweet Gale*, is met with in great abundance in some parts of the Highlands of Scotland, where we have found it diffusing a delightful fragrance. The leaves have a bitter taste, and are sometimes used as a substitute for hops; in some parts the inhabitants scent their clothes with it, and beds are made of the twigs. The berries of *M. cerifera* are covered with a vegetable wax, which is obtained by boiling the berries in water, and when the water cools, the wax floats on the surface; it is made into candles by the inhabitants of Pennsylvania and Louisiana. The decoction of the root is employed as an astringent against hemorrhages of the uterus, and against dropsy. The fruit of *M. cordifolia*, a native of the Cape of Good Hope, yields a great deal of wax, which is made into candles, and is eaten by the Hottentots with their meat instead of bread. *Comptonia asplenifolia* is tonic and astringent, and is much used as a domestic remedy, in the United States, against diarrhæa.

ORDER CCII.—CASUARINACEÆ—BEEFWOODS.

LEAFLESS trees, with pendulous, jointed, striated, sheathed branches, and spikes or heads of unisexual flowers proceeding from bracts. Barren flowers in spikes, and set in whorls round a jointed rachis. Perianth two-leaved, with two alternating bracts. Stamen one; anther erect, two-celled, opening longitudinally. Fertile flowers in a head, with a jointed rachis, and naked. Ovary one-celled; ovules one or two, orthotropical; styles two. Fruit winged nuts, collected in a cone, and hidden in thickened bracts. Seed erect, without albumen, densely coated with spiral vessels; radicle superior.

GENUS.

Casuarina, *L.*

These are large, tropical, or sub-tropical trees, natives of Australia, where they are called *Beefwood Trees*, from the colour of their timber resembling that of raw beef. The wood is very hard and heavy, and is used by the natives to form their war-clubs. The bark of *Casuarina muricata* is said

to be employed in India as a tonic. *C. quadrivalvis* is called *She-Oak*, and the young branches and young cones, when chewed, yield an agreeable and highly refreshing juice when water is not to be had. They are also eaten by cattle. *C. equisetifolia* was introduced to India about fifty years ago, where it is now fully established, growing freely and ripening seed in abundance. The wood is reddish in colour, and in density and appearance resembles Trincomalee wood; it bears a great strain, is well adapted for posts, and is said to bear submersion in water very well.

ORDER CCIII.—GNETACEÆ—JOINT-FIRS.

THESE are small trees or creeping shrubs, with jointed stems and branches, and opposite, reticulated, sometimes scaly leaves; not resinous. Flowers unisexual, arranged in catkins or heads; males with a one-leaved perianth, bearing a monadelphous filament, with two anthers opening by pores; females altogether naked, or with a false perianth consisting of one or two scales. Ovary wanting. Seed drupaceous. Embryo with two seedlobes in the middle of fleshy albumen, and a superior radicle.

GENERA AND SYNONYMES.

Ephedra, *L.*
Gnetum, *L.*

| „ *Thoa*, *Aubl.*
| *Gnemon*, *Rumph.*

| „ *Ula*, *Rhede.*

These are natives of warm regions in Europe, Asia, and South America. The seeds of *Gnetum gnemon* and *G. urens* are eaten; and the interior of the pericarps is lined with stinging hairs. The fruit of *Ephedra distachya*, called *Uvæ maritimæ*, are used in putrid fevers and agues; and these, along with the tops of the shoots, are employed as an astringent.

ORDER CCIV.—TAXACEÆ—YEWS.

THIS family is sometimes included in Coniferæ, from which it is distinguished by the ovules growing singly, unaccompanied with scales, and not collected into a cone.

These are evergreen trees or shrubs, having narrow, alternate, distichous leaves, either without veins or with a forked venation. Flowers unisexual, naked, surrounded by imbricated bracts; the males with several stamens and monadelphous filaments. Anthers combined or distinct, opening longi-

tudinally; females solitary. Ovules naked. Seeds supported on or enclosed in a cup-shaped receptacle. Embryo straight, with two seed-lobes, either inverted or straight.

GENERA AND SYNONYMES.

<i>Taxus</i> , L.	<i>Nageia</i> , Gärt.	<i>Browneria</i> , L. C. R.
<i>Podocarpus</i> , Herit.	<i>Phyllocladus</i> , L. C. R.	<i>Cephalotaxus</i> , Zucc.
<i>Dacrydium</i> , Sol.	<i>Thalamia</i> , Sp.	<i>Salisburia</i> , Sm.
<i>Torreya</i> , Arn.	<i>Robertia</i> , L. C. R.	<i>Ginko</i> , Kämpf.
<i>Caryotaxus</i> , Zucc.		

These are found in Europe, New Zealand, and the Cape of Good Hope. The leaves of the *Yew* (*Taxus baccata*) are decidedly poisonous, both to man and to horses and cows. They have been administered medicinally, and exhibit the same action on the system as *Digitalis*. The fruit is perfectly harmless, and even agreeable to eat, but the seeds are acrid and narcotic. The wood is brownish-red, very close-grained, more or less veined, very hard and durable. It was formerly employed in making bows, and is now applied to cabinet-work, inlaying, and turnery ware. *Dacrydium taxifolium*, a native of New Zealand, is an immense tree two hundred feet high, and from its branches a beverage is made resembling spruce beer. The timber of *D. Franklini* is harder than any Baltic or American Pine; it is an excellent wood for spars for boat-building, and for any naval purpose. The bark of *Phyllocladus trichomanoides* yields a red dye. The fruit of *Salisburia adiantifolia* are as large as damsons, resinous and astringent, and their kernels are eaten by the Japanese to promote digestion. The nuts of *Torreya* are very astringent, and have the property of restraining the urine, for which they are employed by the Japanese interpreters when they expect to be detained a long time in the imperial council chamber.

ORDER CCV.—CONIFERÆ—CONE-BEARERS.

RESINOUS trees and shrubs, sometimes of gigantic growth. *Leaves* stiff



Fig. 210. *a*, Male catkin of *Abies excelsa*; *b*, anther shedding its pollen; *c*, female catkin; *d*, scales of ditto; *e*, scale of a cone; *f*, seeds.

and leathery, generally persistent, needle-shaped or awl-shaped, alternate or gathered in bundles of two to five, and enwrapped at the base by a small sheath. *Flowers* unisexual, arranged in catkins or cones; the *males* are composed of one or of several stamens united, sometimes naked, and sometimes accompanied with a scale, in the axil or on the surface of which they are placed; anthers two or many-lobed, bursting longitudinally, often terminated by a crest; the *females* are formed of scales, furnished at their base with one or several ovules, perforated at the summit, and not contained in an ovary;

at maturity these scales swell and unite, or become woody, then forming a cone or strobile; sometimes, on the contrary, they become fleshy and unite, as in the Juniper, forming a kind of berry. *Seed* frequently crustaceous, sometimes furnished with a membranous, marginal wing. *Embryo* straight, in the axis of oily, fleshy albumen, having two to ten seed-lobes, and a radicle at the apex of the seed, having an organic connection with the albumen.

SUB-ORDER I. ABIETÆ.—Ovules inverted; pollen oval, curved.

GENERA AND SYNONYMES.

Pinus, *L.*
Abies, *T.*

„ *Picea*, *Link.*
„ *Larix*, *T.*

Cedrus, *Mill.*
Cunninghamia *R.Br.*

Bel., *Sal.*
Arthrotaxis, *Don.*

Pherosphæra, <i>Arch.</i>	Sciadopitys, <i>Zucc.</i>	Colymbea, <i>Sal.</i>	Dammara, <i>Rumph.</i>
Microcachrys,	Araucaria, <i>Juss.</i>	Eutassa, <i>Sal.</i>	Agathis, <i>Sal.</i>
[<i>Hook. f.</i>]	Dombeya, <i>Lam.</i>	Altingia, <i>Loud.</i>	

SUB-ORDER II. CUPRESSEÆ.—Ovules erect; pollen sphaeroidal.

GENERA AND SYNONYMES.

Juniperus, <i>L.</i>	Libocedrus, <i>Endl.</i>	Callitris, <i>Vent.</i>	Schubertia, <i>Mirb.</i>
Saxe-Gothæa <i>Lindl</i>	Fitzroya, <i>Hook.</i>	Widdringtonia <i>Endl</i>	Condyllocarpus,
Thuæcarpus <i>Traut</i>	Cryptomeria, <i>Don.</i>	Frencela, <i>Endl.</i>	[<i>Sal.</i>]
Thuja, <i>T.</i>	Thujopsis, <i>Zucc.</i>	Actinostrobus, <i>Endl</i>	Glyptostrobus, <i>Endl</i>
Biota, <i>Don.</i>	Cupressus, <i>T.</i>	Parolinia, <i>Endl.</i>	Sequoia, <i>Endl.</i>
Platycladus,	Chamaecyparis,	Pachylepis,	Wellingtonia, <i>Lindl</i>
[<i>Spach.</i>]	[<i>Spach.</i>]	[<i>Brongn.</i>]	Chamaepeuce, <i>Zucc.</i>
Cyparissa, <i>Don.</i>	Retinispora, <i>Zucc.</i>	Taxodium, <i>L. C. R.</i>	

GEOGRAPHICAL DISTRIBUTION.—These are generally natives of the temperate regions of the northern hemisphere both of the old and new world, reaching even to the extreme limits of vegetation; they are also found in the southern hemisphere in Australia, New Zealand, and the islands of the southern oceans; a few inhabit the tropics of Asia and the Cape of Good Hope.

PROPERTIES AND USES.—The family of the Coniferæ is an important one, as furnishing much valuable timber, and secretions, which are extensively employed in the arts and manufactures. The *Scotch Fir* (*Pinus sylvestris*) is, perhaps, one of the most valuable of the whole; from it we are supplied with the *Red Deal* and *Pine* used in building and carpentry, and the greater portion of the turpentine and tar found in commerce are products of this tree. It is an inhabitant of the whole of the northern region of Europe, where it forms dense natural forests; in the Highlands of Scotland some of these primeval forests still exist, although they are now few in number and limited in extent. The timber is very resinous and durable; besides the ordinary uses to which it is applied, it is employed in making masts to ships, and in ship-building. The resinous roots are dug out of the ground in many parts of the Highlands of Scotland, and, being divided into small splinters, are used by the inhabitants instead of candles. The fishermen make ropes of the inner bark, and the Kamshatdales and Laplanders make bread of it in times of scarcity; this is done by stripping off the outer bark in spring, collecting the soft, white, succulent inner bark, and drying it in the shade; when they intend to use it, they first toast it at the fire, then grind it, and after steeping the flour in warm water to take off the resinous taste, they make it into thin cakes and bake them. Linnæus states that this bread will fatten swine, and that the boys in Sweden frequently peel off the bark in the spring, and eat it raw with a greedy appetite. From the cones a diuretic oil is prepared, like oil of turpentine, and a resinous extract which has similar virtues with balsam of Peru; an infusion of the buds or young shoots has been commended as an anti-scorbutic, and they have been given in dropsy and chronic rheumatism; with the addition of molasses, they have been made into beer. Common *Turpentine*, as we have stated, is largely extracted from the wood of this tree; it is obtained by making incisions in the trunk, or by removing portions of the bark, and the

juice flows into small troughs prepared for the purpose, or into holes made in the ground at the foot of the tree. This is purified by heating and filtering it through straw, or, in summer, by exposing it to the sun in a barrel, through the holes in the bottom of which the melted turpentine escapes; upon standing, it separates into two parts, one liquid and the other of a consistence similar to honey.

A great part of the turpentine made in France is from the *Sea-side Pine* (*P. maritima*), the timber of which is of little value, being light, soft, and spongy; the leaves are eaten by sheep. This is very much cultivated along the sea-coast, particularly in Gascogne, Sologne, Gatinais, Berry, and Bretagne, but it is principally in the department of the Landes that the turpentine is made; the process is the same as has been described above. In the spring, when the resinous sap runs from the wound, it leaves behind it in its course a thick matter like cream, but thicker; this is removed from the tree in winter, and is different from all the kinds of resin and turpentine in use, being called by the French *galipot*, or *barras*; when purified by melting in water and straining, it becomes what is called *Burgundy Pitch*. The turpentine of the consistence of honey, described above as being left behind after the liquid portion has been separated, is put into a still with a large quantity of water, and distilled as long as any oil is seen swimming on the surface of the water; this is the common *oil of turpentine*, and the matter remaining at the bottom of the still is *rosin*. When all the sap has been obtained that the tree will yield, it is hewn down, and the wood cut into billets to make *tar*, as follows:—A conical cavity is dug in the ground, commonly in the side of a bank or on the slope of a hill, within or near a forest; the billets of wood and branches of the pine are filled into the cavity, and piled above it till they form a large stack, and are then covered with turf, beaten firmly down; the stack is kindled, and allowed to burn with a slow smouldering combustion, during which the tar is formed by the decomposition of the resinous juice of the wood. A cast-iron pan receives the tar at the bottom of the cavity as it descends, and delivers it by a projecting spout through the bank or other base of the cavity, into barrels placed to receive it; and the barrels, immediately on being filled, are closed with bungs, and are then ready for exportation. Common *Black Pitch* is made from the refuse of rosin and turpentine, such as will not pass through the straw filter, and the cuttings round the incisions on the tree; this is boiled down slowly, and the residue is pitch; pitch is, in fact, the solid black mass which is left after the liquid parts of tar have been evaporated.

Pinus palustris, or *Swamp Pine*, and *P. taeda*, or *Frankincense Pine*, furnish the Turpentine of America called *Boston Turpentine*, but the former is that from which the greatest supply is obtained; the timber is very durable, fine grained, and receives a high polish; it is extensively employed in ship-building and domestic structures, four-fifths of the houses in the southern states being built with it. From *P. cembra*, the *Siberian Stone Pine*, and *P. pumilio*, a pellucid, whitish, essential oil is obtained, which bears the name of *Carpathian balsam*, and the seeds are eatable, as are those of *P. pinea*, or *Stone Pine*, in the South of Europe, under the name of *pignous doux*. The wood of the *Weymouth*, or *White Pine* (*P. strobus*), has little strength, and gives a feeble hold to nails, but it is light, soft,

easily worked, free from knots, and durable; it makes excellent masts, for which it is imported to this country, and the bowsprits and yards of men-of-war are also of white pine. The timber of *P. Lambertiana* is white, soft, and light, and produces an abundance of pure, amber-coloured resin, which, when the trees are partly burned, acquires a sweet taste, and in this state is used by the natives of the Rocky Mountains as a substitute for sugar. The seeds are eaten either roasted or pounded into coarse cakes, for use during the winter season. The turpentine obtained from *P. mugho* is called *Hungary balsam*; the branches of the tree burn like torches, and they are used for hoops and bands, on account of their suppleness.

Abies excelsa, or *Norway Spruce*, is found throughout the regions of Northern Europe and Asia. The timber is whiter, lighter, less resinous, and more elastic than that of the Scotch fir. It is extensively imported from the Baltic, under the name of *white deal*. The *essence of spruce*, with which spruce beer is made, is obtained by boiling the young branches in water, and evaporating the decoction to the consistence of molasses. From *A. canadensis*, or *Hemlock Spruce*, the substance called *Canada Pitch* is obtained; and *Abies peetinata*, or *Silver Fir*, yields *Strasburg turpentine*; *Canada Balsam* is the product of *A. balsamea*, or *Balm of Gilead Fir*.

The *Common Larch* (*Larix europæa*) is a native of the mountains of Europe; its wood is red, hard, and durable, and its bark yields a great quantity of resinous juice, which furnishes *Venice turpentine*; its wood and branches secrete a sort of glue, sometimes slightly resinous, but more generally gummy, which is called *Oremburg gum*, and dissolves in water like gum arabic. Rinder says that, in the spring, the buds of this tree are covered with a resin analogous to *Balm of Mecca*. In Styria it exhales from its leaves a honied juice, which, becoming hard, forms a kind of manna, called *Manna of Briançon*. *Cedrus Libani* is the *Cedar of Lebanon*, the bark of which is employed in Germany as a febrifuge; from its trunk a turpentine is obtained, which forms *Cedria*, a sort of resin, used by the ancient Egyptians for embalming bodies. *C. deodara* is held sacred by the Hindoos; its oil is said to cure ringworm. *Dammara orientalis*, a native of the Moluccas, exudes from its trunk, either naturally or by incision, a soft, viscid resin, which solidifies in a few days, and sometimes forms large masses; this is called *White Dammar*. It is at first as white as crystal, but afterwards becomes yellow, like amber, with age; when it is liquid it has the odour of other pine resins, but loses it when dry. *D. australis*, or *Cowrie Pine*, is a native of New Zealand, and yields a hard, brittle resin, like copal, which is eaten by the natives like mastich; and the soot formed from its combustion was used by the same people for colouring their tatoo marks, by rubbing it into the wounds. The seeds of *Araucaria braziliensis* and *A. imbricata* are eaten by the inhabitants of Brazil and Chili. *Entassa excelsa* and *E. Cunninghamii* yield resins.

The *Common Juniper* (*Juniperus communis*) is frequently found in this country, in sterile, rocky, mountainous places, and on chalky downs. The whole plant exhales an aromatic odour, particularly when burned, and is on that account frequently used for purifying or perfuming unhealthy apartments and mephitic places, the disagreeable odours of which it conceals, if it does not destroy them. The wood of the Juniper is sudorific, and has been considered equal to guaiacum; the tops of the shoots and the leaves

have some reputation as a purgative, and their ashes are useful in dropsy. In warm countries it has been reported that the stem of Juniper yields, by incision, a resin called *Gum of Juniper*, sometimes erroneously confounded with Sandarach; but it is doubtful whether the plant yields any such secretion, and what is generally supposed to be such is, in all probability, Sandarach itself. The "berries," which are in reality small cones of three scales closely united, are well known to those who are acquainted with the plant; they are the size of a pea, and black when ripe, with a bitter, sweetish, and balsamic taste; they are pulpy, sugary, and contain utricles filled with volatile oil, when the fruit is green, changing to a true turpentine when at maturity; so that to obtain the oil the green fruit must be used, and the ripe fruit for the extract. Juniper berries are stomaehic, increasing the appetite, and facilitating digestion; they are excitant, acting on the cutaneous exhalations, and augmenting perspiration; they also stimulate the kidneys, and increase the quantity of urine, to which they communicate the odour of violets. The *essential oil of Juniper*, obtained by distillation of the green berries, has all these properties, which it communicates in doses of from five to twenty drops. The berries communicate the peculiar flavour to Hollands and to English gin; in the manufacture of the former they are ground along with the malt and distilled; it is from this circumstance that these spirits are called Geneva, or simply Gin, from the French *Génévièvre*, the name of the berries. In the South of France the peasantry prepare, from the interior reddish wood of the bark and branches of *J. oxycedrus*, a sort of tar, called *huile de cade*; it is obtained by distillation, in the same way as we have described for the tar of the pine; this they use internally for worms, and externally for scabs and ulcers in horses and cattle; it is also used for boats and ships.

Savin (*Juniperus sabina*), a native of the South of Europe and the Levant, is a low, spreading, evergreen shrub, rarely ever more than three or four feet high. Its foliage has a strong, fetid, aromatic, and penetrating odour, particularly when rubbed between the fingers, and a warm, bitter taste; its exhalations cause headache. The plant contains about one-fifth of its weight of an essential oil, which is obtained by distillation with water, and it is in this oil that the active properties of the plant reside; and these properties are more marked when it is fresh than dried. The leaves and shoots are powerfully excitant, and, applied in the state of powder, produce a true inflammation; in this state they are employed in some ulcers as a detergent, and they enter into an ointment for keeping up a suppuration from blistered surfaces. This is a plant which, in every form, should be administered with caution: in too large doses it inflames the stomach, duodenum, and rectum, causing death. It has been used in chronic rheumatism, and as a remedy for worms, and it also acts as an emmenagogue. In powder and infusion Savin is used as an application to warts, indolent, carious, and gangrenous ulcers, itch, and scalled head; and the expressed juice of the fresh leaves, diluted with water, is sometimes applied to similar purposes. *J. virginiana*, commonly called *Red Cedar*, has all the properties of Savin, and as such is used in the United States, where it is indigenous. The fresh leaves, boiled in double their weight of fat, with the addition of a little wax, forms an epispastic pomatum, used in the country. Small excrescences sometimes found on the branches are called cedar apples, and

are used as an anthelmintic. The wood is remarkably durable, and is used for furniture and cabinet-work. The *Bermuda Cedar* (*J. bermudiana*) is the tree that furnishes that fine, fragrant, red wood, with which black-lead pencils are covered in this country; it was formerly much used for furniture and wainscoting, but it is now chiefly employed for the purpose just mentioned, for lining cabinets, and for fancy wood-work. The wood is red, very light, fragrant, and almost incorruptible; with the berries a syrup is made, which is said, by Michaux, to be beneficial in diseases of the lungs.

The *American Arbor Vitæ* (*Thuja occidentalis*) is common in shrubberies in this country, and is sometimes used for making hedges, for which it is well adapted. The tree is a native of North America, from Canada to Virginia, and attains the height of twenty-five or thirty feet. In Canada it is much esteemed as a timber tree; its trunk is cut into planks and boards for building houses and boats; its branches are used for posts and fences; of its smaller branches and spray besoms are made; and its leaves, with lard or animal fat, form an ointment, employed by the natives as a cure for rheumatism; fences made of it last longer than of any other wood, and the timber is employed in cabinet-work and turnery. The twigs and leaves have an agreeable, balsamic odour, especially when rubbed, and a strong, balsamic, camphorous, bitter taste; the leaves are filled with resinous vesicles, from which an essential oil is obtained by distillation, that has been used as a vermifuge; in the state of decoction, they have been used in intermittent fever, coughs, scurvy, and rheumatism. The *Common Cypress* (*Cupressus sempervirens*) is a native of the South of Europe and the Levant, and is cultivated for planting in shrubberies and cemeteries, for which its upright form and sombre appearance peculiarly fit it. The wood of the Cypress is reddish yellow, and remarkably durable; with it the ancient Egyptians made some of their mummy-chests, and the Greeks statues of their gods; the gates of the temple of Ephesus were made of it, and also those of St. Peter's at Rome, which lasted from the time of Constantine till Pope Eugenius IV., a period of eleven hundred years, when they were supplanted by gates of brass, but were even then sound and entire. Sprigs of cypress are kept among clothes, in the South of Europe, to preserve them from insects; and an essential oil obtained from the tree has been given with success against intestinal worms. The chips of the wood of *C. thuyoides*, or *White Cedar*, are used in North America as a stomachic. From *Callitris quadrivalvis* (*Thuja articulata*) the resin called *Sandarach* is obtained. The tree grows in Morocco, Barbary, and Arabia, and attains the height of fifteen or twenty feet. The resin exudes from the tree spontaneously during the heats; it has the odour and taste of pine resin, and a slightly acrid taste; it melts with heat, diffusing a strong, balsamic odour, and easily inflames. It was formerly given as a medicine internally, and it enters into the composition of various ointments and plaisters. It is principally used in making varnish, and sometimes employed in incense; and it also constitutes the pounce used after writing has been erased to prevent the ink from running. *Widdringtonia juniperoides* is a native of the Cape of Good Hope, in the Clanwilliam district. It is a valuable tree on account of its timber, which has a peculiar smell, and is employed for house and ship-building, for cabinet-work and furniture; it is very durable, and its

resinous smell keeps it from the attacks of insects. The *Deciduous Cypress* (*Taxodium distichum*) is a native of the swamps in the Southern States of North America, where it sometimes attains the height of a hundred and twenty feet, with a stem twenty to forty feet in circumference at the base. Being an inhabitant of swamps and quaking marshes, it would be supposed that a tree of such dimensions would have difficulty in taking firm root in such situations; and so it would, were it not for a beautiful provision with which it is endowed. The roots run along just under the surface, and at short intervals throw down long shoots perpendicularly into the swamp, much in the same way as the Banyan tree throws down its perpendicular roots; and the roots thus extending and driving down, as it were its subaqueous piles at frequent intervals, these immense trees are kept in a fixed position. At the spot where these perpendicular roots are emitted there rises, on the surface of the soil, a large excrecence of woody matter, sometimes acquiring large dimensions, and having the appearance of boundary-stones; these never show any inclination to grow into ramifications, but continue mere lumps of woody enlargement. The wood of the Deciduous Cypress is of a reddish colour, elastic, strong, and durable, and neither so heavy nor so resinous as the timber of the pines; it yields a sweet-swelling resin; a decoction of the cones is used as a diuretic. The tree is highly ornamental; it is often met with in collections in this country.

ORDER CCVI.—CYCADACEÆ—CYCAS FAMILY.

THESE are small, palm-like trees, or shrubs, with unbranched or occasionally forked stems, the interior of which consists of bundles of woody fibre in a mass of pith, either disposed irregularly, or collected into regular and numerous concentric circles. Leaves pinnated, hard, and woody, unfolding in a coil, like those of some ferns. Flowers unisexual; the males composed of numerous anthers, fixed on the inferior surface of scales arranged in cones; females of one or two ovules, in the axil of scales arranged in cones also, or in bunches on a leafy axis. Seeds with fleshy albumen, in the cavity of which the embryo is suspended by a long cord; seed-lobes unequal; radicle superior.

GENERA AND SYNONYMES.

<i>Cycas</i> , <i>L.</i>	<i>Zamia</i> , <i>L.</i>	<i>Macrozamia</i> , <i>Miq.</i>
<i>Dion</i> , <i>Lindl.</i>	? <i>Arthrozamia</i> , <i>Rehb.</i>	<i>Dipsacozamia</i> , <i>Lehm.</i>
<i>Platyamia</i> , <i>Zucc.</i>	<i>Encephalartos</i> , <i>Lehm.</i>	<i>Ceratozamia</i> , <i>Ad. Brongn.</i>

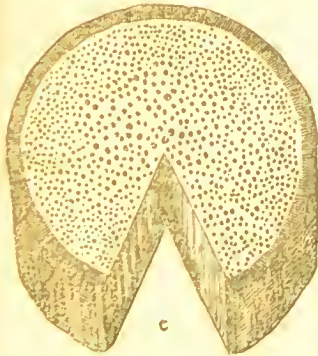
Natives of the tropics of Asia, Africa, and America. A kind of sago is produced from the pith of *Cycas revoluta* in Japan, and the nuts are eatable. In the Moluccas *C. circinalis* also yields sago, and the fruits, which are the size of an Orleans plum, are eaten, after being fermented and roasted; from the same plant a gum is obtained, similar to tragacanth, and is used against malignant ulcers.

SUB-DIVISION II.—ENDOGENS, OR MONOCOTYLEDONS.

ENDOGENS, or Monocotyledons, include about one-fifth of known plants, and are distinguished by having only one cotyledon or seed-lobe, which in germination merely rises to the level of the soil ; but there are other characters which distinguish these from all other plants, of which we shall speak more at length presently ; meanwhile we shall follow the development of an endogenous plant from germination to perfect growth. Fig. A represents the section of the seed of Maize, or Indian Corn ; the organized body *a*, lying on one side, is the embryo ; and the mass *b*, lying on the other, is the albumen.

When the seed begins to germinate, the seed-lobe (cotyledon), Fig. B, *a*, is elongated, and perforated by the plumule *b*, which takes an upward direction into the air ; the root-sheath (coleorhiza), fig. *c*, is penetrated by the radicle, fig. *d*, which takes a downward direction into

the soil, elongates, and after a short time dies away, the plant being fixed in the soil and nourished by adventitious roots, *eee* issuing from the base of the radicle. The roots of endogenous plants never produce a tap root, but the stem terminates abruptly at the base, and the roots



are produced directly from the subterraneous truncated part, forming a mass sometimes as thick as the stem itself.

In Endogens the growth of the stem takes place from within outwards, and is not arranged in concentric layers, as in Exogens, but is composed of vascular and ligneous threads distinct from each other, confused and scattered in midst of cellular tissue, which forms the mass of

the stem Fig. c, and d. The bark is quite confounded with the ligneous mass, and its structure entirely agrees with that of the stem, which is, as we have said, composed of ligneous threads dispersed in cellular tissue. Except in some rare instances, the stem is perfectly simple, and without any ramifications. The development or growth being from within outwards, it therefore follows that the internal structure of the stem is the youngest and softest, while the external is the oldest and hardest; so that, in fact, we have the anomaly of the heartwood on the outside.

In the leaves of Endogenous plants the nerves are, with few exceptions, parallel and simple, uniting only at the extremities, and do not form the network so remarkable in Exogens; the leaves themselves are generally simple and entire, sessile, and embracing the stem, or with a sheathing petiole.

Their flowers are arranged after the ternary type, that is, composed of a floral envelope with six divisions, ranged in two alternate series, of three fleshy parts each; of three or six stamens opposite the divisions of the envelope; and of a pistil with three carpels. There are, however, modifications of this floral organization, as, for example, the transformation of many of the six stamens into petal like bodies, called staminodes; and in the group Glumiferae, the flowers of which have only a bract for their floral envelope; but the ternary symmetry almost always distinguishes the flowers of Endogens from those of Exogens, which are generally arranged after the binary or quinary type.

The Endogens, or Monocotyledons, are divided into three classes, viz. :—
I. DICTYOGENÆ; II. PETALOIDEÆ; III. INCOMPLETEÆ; and IV. GLUMIFERÆ.

CLASS I. DICTYOGENÆ.—Endogens with the veins of the leaves in the form of network, wood of the stem, when perennial, arranged in a circle, with a central pith.

Order 207. DIOSCORIACEÆ.

208. SMILACEÆ.

209. TRILLIACEÆ.

210. ROXBURGHIIACEÆ.

211. PHILESIACEÆ.

CLASS II. PETALOIDEÆ.—Leaves with parallel veins. Flowers usually consisting either of a coloured floral envelope, or of whorled scales.

Group 1. *Hypogynæ*.—Perianth free; ovary superior; flowers generally hermaphrodite.

Order 212. BUTOMACEÆ.

213. ALISMACEÆ.

214. JUNCAGINACEÆ.

215. PONTEDERACEÆ.

216. LILIACEÆ.

216* TILLANDSIACEÆ. (P. 884.)

217. MELANTHIACEÆ.

218. GILLIESIACEÆ.

219. COMMELYNACEÆ.

220. XYRIDACEÆ.

221. MAYACACEÆ.

222. PHILYDRACEÆ.

223. JUNCACEÆ.

224. PALMÆ.

Group 2. *Epigynæ*.—Perianth adherent to the ovary; ovary inferior; flowers generally hermaphrodite.

Order 225. HYDROCHARIDACEÆ.

226. BROMELIACEÆ.

- Order 227. TACCACEÆ.
 228. HÆMODORACEÆ.
 229. HYPOXIDACEÆ.
 230. AMARYLLIDACEÆ.
 231. IRIDACEÆ.
 232. ORCHIDACEÆ.
 233. APOSTASIACEÆ.
 234. BURMANNIACEÆ.
 235. ZINGIBERACEÆ.
 236. MARANTACEÆ.
 237. MUSACEÆ.

Group 3. *Incompleteæ*. — Flowers with no proper perianth, or with a few whorled scales, often unisexual.

- Order 238. PANDANACEÆ.
 239. TYPHACEÆ.

- Order 240. ARACEÆ.
 241. ACORACEÆ.
 242. LEMNACEÆ.
 243. NAIADACEÆ.
 244. TRIURIDACEÆ.
 245. RESTIACEÆ.
 246. ERIOCAULONACEÆ.
 247. DEVAUXIACEÆ.

Group 4. *Glumiferaæ*. — Flowers consisting of imbricated bracts, arranged in spikelets, and without a proper perianth.

- Order 248. CYPERACEÆ.
 249. GRAMINEÆ.



ORDER CCVII.—DIOSCORIACEÆ.—YAMS.

CLIMBING shrubs, generally with a fleshy tuberous root. *Leaves* alternate, sometimes opposite, having the nerves irregularly ramified. *Flowers* unisexual, rarely hermaphrodite. *Perianth* herbaceous, having six divisions, adherent. *Stamens* six, free, rarely monadelphous, inserted in the base of the sepals; *anthers* turned inwards. *Ovary* inferior, three-celled, each cell containing one, two, or more inverted ovules, hanging from their inner angle; *styles* three. *Fruit* either a thin, compressed, three-celled capsule, sometimes three-winged, or a three-celled berry crowned with the limb of the perianth. *Seeds* two in each cell, or solitary by abortion, having a very small embryo placed near the hilum, lying in the cavity of dense, horny albumen.



Fig. 211. Section of the female flower of *Tamus communis*.

GENERA AND SYNONYMES.

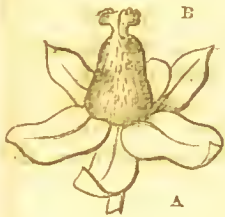
<i>Tamus</i> , <i>L.</i>	<i>Janraja</i> , <i>Pl.</i>
<i>Tannus</i> , <i>Juss.</i>	<i>Dioscorea</i> , <i>L.</i>
<i>Testudinaria</i> , <i>Sal.</i>	<i>Ubium</i> , <i>Rumph.</i>
<i>Helmia</i> , <i>Kunth.</i>	<i>Oncus</i> , <i>Lour.</i>
<i>Rajania</i> , <i>L.</i>	<i>Podianthus</i> , <i>Shnitz.</i>

GEOGRAPHICAL DISTRIBUTION.—Natives of the tropics of both hemispheres, with the exception of *Tamus*, which is found in Europe and temperate Asia.

PROPERTIES AND USES.—The roots of the Yams contain an immense quantity of starch mixed with an acrid, bitter substance, which has not yet been analysed. *Dioscorea sativa*, or *Cultivated Yam*, grows wild in Ceylon and Malabar. The roots are the size of a man's leg, and they are used in a diversity of ways, either in substance or reduced to flower and formed into puddings and bread. *D. alata* is much grown in America, where it forms the principal food of the negroes and natives. *D. bulbifera* is that used by the natives of Tahiti and the Moluccas. The *Chinese Yam* (*D. batatas*), recently introduced to this country as a substitute for the potatoe, has not as yet realised any of the expectations with which it was regarded; to me, a serious obstacle against its general cultivation at present is the club-shape of its roots, which prevents them being extracted with freedom from the great depths they extend into the soil; however, if that be the only objection, engineering skill would soon dispose of that. The root-stock of *Testudinaria elephantipes*, called *Elephant's Foot* or *Hottentot's Bread*, forms a large, fleshy mass covered with a rough and cracked bark, and this is used by the Hottentots, in times of scarcity, as a sort of yam. The roots of *Black Bryony* (*Tamus communis*) are so acrid that the pulp has been formerly used as a stimulating plaster; the young shoots are so mild as to be eaten like asparagus, in Italy.

ORDER CCVIII.—SMILACEÆ—SARSAPARILLAS.

HERBS or shrubs, sometimes with fleshy roots and a climbing growth. *Leaves* reticulated. *Flowers* hermaphrodite or unisexual. *Perianth* free, six-parted. *Stamens* six, inserted near the base of the perianth, seldom hypogynous. *Ovary* superior, three-celled, the cells one or many-ovuled; *style* three-cleft. *Stigmas* three; *ovules* pendulous from the axis, orthotropal. *Fruit* a berry. *Seed* with a very small embryo, lying in the cavity of albumen, which is between fleshy and cartilaginous.



GENERA.

Smilax, L.
Ripogonum, Forst

Coprosmanthus, Kunth.
Heterosmilax, Kunth.

GEOGRAPHICAL DISTRIBUTION.—Natives of the tropics of Asia and America, but also found in most parts of the world.

PROPERTIES AND USES.—To this family the plants producing *Sarsaparilla* belong. It was formerly supposed that this drug was the produce of *Smilax sarsaparilla*, but it is doubtful whether any of it was ever obtained from that species. There are several to which the source has been ascribed; Hernandez mentions four, and Humboldt three,

distinct species, but there are few of the genus possess any useful medicinal properties. It is from Brazil, Mexico, and the Spanish Main, that the supplies are obtained. According to Martius, the *Brazilian* or *Lisbon Sarsaparilla* is the product of *S. syphilitica*; but Dr. Hancock is of a contrary opinion, believing it to be an undescribed species; while Richard ascribes it *S. papyracea*. It comes from the ports of Para and Maranham in cylindrical bundles three to five feet long by about a foot in thickness, and is the variety which Dr. Hancock says is celebrated throughout South America by the name of Sarsa of the Rio Negro, and is considered the most valuable variety of the drug. *Jamaica Sarsaparilla* is not produced in that island, but is in all probability derived from Central America. It is generally in bundles, twelve or eighteen inches long by four or five in thickness, and consists of long slender roots folded up; it is supposed to be obtained from *S. officinalis*. *Honduras Sarsaparilla* is the variety most used in the United States. *Vera Cruz Sarsaparilla* is supposed to be obtained from *S. medica*. As a medicine, Sarsaparilla has a very variable reputation, some physicians regarding it as of very marked efficacy, and others as being wholly inert. In all probability these conflicting opinions have arisen either from the inferior quality of the drug or the mode of preparation, for if kept for too long a period it entirely loses its medicinal virtues. Its greatest reputation is in the cure of secondary syphilis, but it is also employed in chronic rheumatism, scrofulous affections, certain cutaneous

Fig. 212. A, Flower of *Smilax braziliensis*; B, section of the ovary of ditto.

diseases, and other depraved conditions of the general health. The virtues of the root reside in a crystalline principle called *sarsaparillin*; it is white, inodorous, almost tasteless in the solid state, but of a bitter, acrid, nauseous taste, when dissolved in alcohol or water. Sarsaparilla contains, beside this peculiar principle, a colouring substance; resin; starch; lignin; a thick, aromatic, fixed oil; a waxy substance, and chloride of potassium, and nitrate of potassa. The proportion of starch is large.

Smilax china grows in China and Japan, and Thunberg states that, while the Japanese bought annually large quantities of it from the Chinese, he found it in great abundance wild in their own country; the root, which is large and fleshy, is used in decoction as a purifier of the blood, and as a sudorific. It is considered useful in cutaneous diseases, rheumatism, gout, paralysis, scrofula, and dropsy. *S. aspera*, a native of the South of Europe, is frequently used as a substitute for sarsaparilla. The roots of *S. pseudo-china* are said to be used for fattening hogs in the United States, and to be largely used as an alterative medicine; with the roots, maize, sassafras, and molasses, the negroes of Carolina make a very pleasant beer. The leaves of *S. glycyphylla*, a native of Australia, have a sweet taste, and are used as a substitute for tea, under the name of *Sweet Tea*. The shoots of *S. tamnoides* are eaten in the spring in Carolina, and the decoction of the roots is drunk as a purifier of the blood.

ORDER CCIX.—TRILLIACEÆ.—TRILLIUM FAMILY.

THESE are generally included in the preceding order. They are herbs, with tubers or root-stocks, whorled leaves, and hermaphrodite flowers. Perianth of six or eight divisions, in two rows, the inner one sometimes coloured. Stamens six, eight, or ten, with awl-shaped filaments that extend beyond the anthers. Ovary free, three to five-celled, having a central ovule-bearer; ovules numerous, ascending; styles three to five. Fruit succulent, three to five-celled. Seeds numerous, with a minute embryo in fleshy albumen.

GENERA AND SYNONYMES.

Paris, *L.*
Demidovia, *Hoffm.*

Trillium, *Mill.*
Phyllantherum, *Raf.*
Delostylis, *Raf.*

Medeola, *Gronov.*
Gyromia, *Nutt.*

Natives of thickets, in Europe, Asia, and North America. *Paris quadrifolia*, or *Truelove*, is considered a narcotic poison; its berries, which, it is said, poison poultry, are the most deleterious part of the plant. The roots of *Trillium cernuum* have a balsamic odour and taste, and are thought to be tonic, astringent, and expectorant. The root of *Medeola virginica* is emetic and diuretic.

ORDER CCX.—ROXBURGHIAEÆ.—ROXBURGHIA FAMILY.

TWining shrubs, with reticulated leathery leaves, and large, showy, solitary flowers. Perianth of four large, petal-like divisions. Stamens four, hypogynous. Ovary superior, one-celled, with two many-ovuled ovule-bearers, arising from the base; ovules anatropal; style none. Fruit one-celled, two-valved, with two clusters of seeds at the base. Seeds attached to long cords, which are united to a flaxen aril. Embryo taper, in the axis of fleshy albumen.

GENUS AND SYNONYMS.

Roxburghia, *Dryander*.
Stemona, *Lour*.
Ubium, *Rumph*.

Natives of the warmer parts of India. The roots of *Roxburghia gloriosides*, after undergoing a preparation with lime water, are candied with sugar, and taken with tea in India.

ORDER CCXI.—PHILESIACEÆ.—PHILESIA FAMILY.

THIS order differs from Roxburghiaeæ in having marginal ovule-bearers, and orthotropal ovules. It is composed of twining or upright shrubs, with one-nerved, leathery leaves, and large, showy, solitary, hermaphrodite flowers. Perianth with six divisions, three of which are very short and calyx-like. Stamens six, inserted in the base of the perianth. Ovary one-celled, free, with three marginal ovule-bearers; ovules numerous, orthotropal; style long, club-shaped; stigmas three. Fruit succulent.

GENERA AND SYNONYME.

Philesia, *Commers*.
Lapageria, *R. & P*.
Campia, *Domb*.

Natives of Chili and Peru. *Lapageria rosea* has berries as large as a grape, sweet and nutritive; its roots are used as a substitute for sarsaparilla.

ORDER CCXII.—BUTOMACEÆ.—FLOWERING RUSHES.

MARSHY and aquatic plants, sometimes with a milky juice. *Leaves* all proceeding from the root, half-sheathing at the base, very cellular, and with parallel veins. *Flowers* hermaphrodite, regular, either solitary or arranged in umbels. *Perianth* in six divisions, which are arranged in two series, the exterior calyx-like and herbaceous, the interior petal-like and coloured. *Stamens* definite or indefinite, inserted in the receptacle, and sometimes sterile; *anthers* turned inwards, and opening by two longitudinal cells. *Ovaries* free, three, six, or more, arranged in a whorl, either distinct or united at their bases, or by their ventral suture; each ovary is one-celled, and contains numerous anatropal or campylotropal ovules, attached to a netted parietal ovule-bearer. *Styles* distinct; *stigmas* sessile. *Fruit* formed of the same number of carpels as there were ovaries, which are either distinct or united, and many-seeded. *Seeds* very minute, attached to a seed-bearer, lining the internal surface of the carpels. *Embryo* without albumen, with the same direction as the seed, and with an inferior radicle.



Fig. 213. Fruit of *Butomus umbellatus*, with a section of one of the carpels, showing the seeds.

GENERA AND SYNONYME.

Butomopsis, Kunth.
Tenagocharis, Hochst.
Butomus, T.

Hydrocleis, Rich.
Limnocharis, H. & B.

GEOGRAPHICAL DISTRIBUTION.—Natives of marshes, in the temperate regions of the northern hemisphere, and of the tropics of America.

PROPERTIES AND USES.—The *Flowering Rush*, called by botanists *Butomus umbellatus*, one of the most lovely of our aquatic plants, forms the type of this family. It is abundant in some parts of Britain, and may be met with decking the margins of running brooks, ponds, and lakes, in June and July, with its umbels of beautiful rose-coloured flowers; its leaves are said to be aperient, and useful in obstructions, and its root-stocks and seeds were considered emollient and refrigerant; the root-stock, when roasted, is eaten in Northern Asia. *Limnocharis Humboldtii* has a singular provision at the apex of each leaf, where there is an open hole from which the superabundant moisture is continually draining off.

ORDER CCXIII.—ALISMACEÆ—WATER-PLANTAINS.

AQUATIC plants, mostly with a long, creeping root-stock. *Leaves* all proceeding from the root-stock, which they embrace with their base, having parallel nerves which converge at the apex. *Flowers* hermaphrodite or unisexual, regular, arranged in racemes, whorls or panicles. *Perianth* in six divisions, the three outer herbaceous, and the three inner petal-like. *Stamens* inserted in the receptacle, or in the base of the perianth, and either equal in number with its lobes, or double or a multiple of that number; *anthers* turned inwards. *Ovaries* superior, three, six, or more, rarely solitary, each containing one solitary, campytropal ovule, or two placed one above the other, which are either erect, ascending, or horizontal. *Styles* and *stigmas* as many as the ovaries. *Fruit-carpels* one-celled, one or two-seeded. *Seeds* hooked, without albumen. *Embryo* shaped like a horse-shoe.



Fig. 214. A, Flower of *Alisma plantago*; B, section of a carpel; C, fruit.

GENERA AND SYNONYMES.

Alisma, Juss.
Echinodorus, Rich.

Sagittaria, L.
Lophiocarpus, Kunth

Damasonium, Juss.
Actinocarpus, R. Br.

GEOGRAPHICAL DISTRIBUTION.—Natives of running waters and marshy places in the temperate regions and tropics of both hemispheres.

PROPERTIES AND USES.—These are for the most part acrid, and resemble in their action the family of *Ranunculaceæ*. Haller states that *Alisma plantago*, or *Water Plantain*, applied to the skin, inflames and blisters, and another authority says that it is so acrid that cattle have been killed by eating it. The root-stocks contain starch, and, when dried, are eaten by the Calmucks; so that, like the *Ranunculaceæ*, to which they are nearly allied, the plants of this family appear to lose their acridity by drying. Some years ago it was highly extolled as a remedy in hydrophobia; but, after repeated experiments, and a searching inquiry as to its effects, it was found to be perfectly useless. At the root-stock of *Sagittaria sagittifolia*, or *Arrow-head*, there is a tuber composed almost entirely of starch. The fecula of these tubercles Martius compares to arrow-root, and both by the Calmucks, the Chinese, and the Japanese, they are eaten as articles of wholesome food; by the two latter the plant is cultivated for these tubercles. The plant is abundant in many parts of this country, and is easily distinguished by the leaves having the shape of an arrow head. According to Martius, various species of *Sagittaria*, natives of Brazil, are astringent, and their expressed juice is even employed in

making ink. The root-stocks of *Damasonium stellatum*, or *Star-fruit* are acrid, and were held in reputation by the ancients against the bite of a mad dog.

ORDER CCXIV.—JUNCAGINACEÆ—ARROW-GRASSES.

THIS family also is frequently included in Alismaceæ, of which some botanists regard it as a sub-order, and from which it is separated by its scaly flowers, extrorse anthers, and straight embryo. It is composed of aquatic plants, with narrow or broad leaves, quite distinct from the leaf-stalk, and hermaphrodite inconspicuous flowers, arranged on spikes, or in racemes. Perianth greenish, with six divisions, the outer and inner series of which are alike, and sometimes wanting. Stamens six; anthers turned outwards. Carpels three to six, distinct or united, with one or two collateral erect ovules. Fruit-carpels one or two-seeded. Seeds without albumen; embryo straight.

GENERA AND SYNONYMES.

Triglochin, <i>L.</i>	Ruppia, <i>L.</i>	Aponogeton, <i>L.</i>	Ouvirandra, <i>Thours</i>
Juncago, <i>T.</i>	Potamogeton, <i>L.</i>	Spathium, <i>Lour.</i>	Hydrogeton, <i>Pers</i>
Tristemon, <i>Raf.</i>	Peltopsis, <i>Raf.</i>	Cyenogeton, <i>Endl.</i>	Limnogeton, <i>Edgw.</i>
Scheuchzeria, <i>L.</i>			

These are natives of marshes in almost every part of the world, from Iceland to the Cape of Good Hope. *Triglochin palustre* and *T. maritimum* form excellent food for cattle, of which they are very fond, and therefore it has been suggested that the latter might be cultivated successfully on sandy saltwater beaches, where nothing else will grow. From the ashes of a species of *Triglochin*, soda is obtained in the South of Europe. It is said that the root of *Potamogeton natans* is eaten in Siberia. In Iceland, where *P. marinum* is very abundant, it forms an important article of human food in times of scarcity, and in Norway soda is extracted from it. Some, as *P. perfoliatum*, are astringent, and are used in decoction for dysentery and similar affections.

ORDER CCXV.—PONTEDERACEÆ—PONTEDERIA FAMILY.

DISTINGUISHED from Liliaceæ by the divisions of the perianth coiling inwards like a watch-spring after expansion, and by their mealy albumen and indefinite number of seeds. They are aquatic plants, natives of North and South America, India, and the tropics of Africa. The flowers are spathaceous, and either solitary or in spikes. Perianth tubular, six-parted,

coloured, irregular. Stamens six or three, perigynous; anthers turned inwards. Ovary free, or sometimes slightly adherent, three-celled, three-valved, and opening through the valves. Seeds attached to a central seed-bearer, ascending; embryo in the axis of mealy albumen.

GENERA AND SYNONYMES.

Heteranthera, R. & P.	Leptanthus, L. C. R.	Pontederia, L.
Buchozia, Fl. Fl.	Schollera, W.	Unisema, Raf.
Heterandra, Palis.	Eichornia, Kunth.	Monochoria, Presl.

The root of *Monochoria* (*Pontederia*) *vaginalis*, called *Carim-gola*, in India, is used, cooked with sugar, in liver and stomach complaints; rubbed up with butter and drank, it is supposed to remove redness in the eyes; reduced to powder, and mixed with sugar, it is thought to be anti-asthmatic; and chewed, it allays toothache. The herb, rubbed up with milk, is recommended in fevers. The young leaves are eaten as a potherb.



ORDER CCXVI.—LILIACEÆ—LILIES.

HERBS, shrubs, or trees, having bulbs, tubers, or root-stocks, or simple



Fig. 215. *Brodiaea californica*. A, Section of the ovary of *Hyacinthus orientalis*; B, section of the seed of *Arthropodium*; C, ditto of *Tulipa*; D, ditto of *Asphodelus*.

fibrous roots. *Leaves* simple, entire, sheathing, or embracing the stem at the base, mostly narrow, flat, and channelled, or sometimes round, cylindrical, and hollow, very rarely expanded into a blade, furnished with nerves. *Flowers* hermaphrodite, very rarely, if ever, truly unisexual, sometimes solitary and terminal, sometimes in simple spikes, or in branching bunches. *Perianth* free, in six divisions, either distinct, or united, forming a tube with a six-cleft limb. *Stamens* six, sometimes three, inserted at the base of the divisions, when these are distinct, or in the tube when they are united; *anthers* turned inwards, two-celled, bursting longitudinally. *Ovary* free, three-valved, and three-celled, each cell containing a variable number of ovules attached to its inner angle, and disposed in two series. *Style* simple or wanting, terminated by a three-lobed stigma. *Fruit* either a three-celled capsule, opening in three valves,

bearing the partitions on their inner surface, or a fleshy berry. *Seeds* numerous, rarely free, or solitary, with a covering, sometimes black and crustaceous, and sometimes simply membranous. *Embryo* in fleshy albumen, rarely excentric, straight, or curved, sometimes minute; radicle next the hilum.

SUB-ORDER I.—TULIPEÆ.

Division of the perianth distinct, or very slightly united at the base,

frequently nectariferous. Stamens inserted in the receptacle, or at the base of the perianth. Fruit a capsule. Embryo minute, straight, or curved in the base of the albumen.

GENERA AND SYNONYMES.

Erythronium, <i>L.</i>	Iphigenia, <i>Kunth.</i>	Calochortus, <i>Pursh.</i>	Lilium, <i>L.</i>
Dens-Canis, <i>T.</i>	Plecostigma, <i>Traut.</i>	Cyelobothra, <i>Don.</i>	Amblirion, <i>Raf.</i>
Tulipa, <i>T.</i>	Hornungia, <i>Bernh.</i>	Eucrinum, <i>Nutt.</i>	Martagon, <i>T.</i>
Orithya, <i>Don</i>	Lloydia, <i>Salisb.</i>	Fritillaria, <i>L.</i>	Cardioerinum, <i>Endl.</i>
Gagea, <i>Salis.</i>	Rhabdoerinum,	Petilium, <i>L.</i>	Clenostylis, <i>Hochst.</i>
Ornithoxanthum,	[<i>Rehb.</i>	Imperialis, <i>Juss.</i>	? Gloriosa, <i>L.</i>
[<i>Link.</i>	Nectarobothrium	Rhinopetalum,	Methonica, <i>Herm.</i>
Bulbillaria, <i>Zucc.</i>	[<i>Led.</i>	[<i>Fisch</i>	

SUB-ORDER II.—AGAPANTHEÆ.

Perianth tubular, with a six-cleft limb. Stamens inserted in the perianth. Fruit capsular. Seeds inverted, having a membranous covering, generally pale.

GENERA AND SYNONYMES.

Funkia, <i>Sp.</i>	Agapanthus, <i>Herit.</i>	Triteleja, <i>Hook.</i>	Nothoscordum,
Hosta, <i>Tratt.</i>	Abumon, <i>Ad.</i>	Seubertia, <i>Kth.</i>	[<i>Kth.</i>
Bryoeles, <i>Sal.</i>	Polianthes, <i>L.</i>	Tristagma, <i>Pöpp.</i>	Ornithogalodium
Niobe, <i>Sal.</i>	Blandfordia, <i>Sm.</i>	Milla, <i>Cav.</i>	[<i>Don.</i>
Saussurea, <i>Sal.</i>	Leucocoryne, <i>Lindl.</i>	Caloscordum, <i>Herb.</i>	Callioprora, <i>Lindl.</i>
Libertia, <i>Dum</i>	Brodiea, <i>Sm.</i>	Hesperoscordum,	Bessera, <i>Schult.</i>
Phormium, <i>Forst.</i>	Hookeria, <i>Sal.</i>	[<i>Lindl.</i>	Pharium, <i>Herb.</i>
Chlamidia, <i>Bnks.</i>	Dichelostemma,	Pseudoscordum,	
	[<i>Kunth.</i>	[<i>Herb.</i>	

SUB-ORDER III.—ALOEÆ.

Perianth tubular, six-cleft, sometimes six-parted. Stamens inserted in the receptacle or in the tube of the perianth. Fruit a capsule or a berry. Seed compressed, angled or winged, with a membranous covering, pale or black. Embryo straight.

GENERA AND SYNONYMES.

Sansevieria, <i>Th.</i>	Tritoma, <i>Ker.</i>	Kniphofia, <i>Mön.</i>	Agriodondron,
Acynta, <i>Com.</i>	Tritomanthe <i>Hffg</i>	Aloë.	[<i>Hav.</i>
Salmia, <i>Cav.</i>	Tritomium, <i>Lk.</i>	Catevala, <i>Medik.</i>	Lomatophyllum, <i>W.</i>
Reineekia, <i>Kth.</i>	Rudolpha - Ro-	Apiera, <i>W.</i>	Phylloma, <i>Akr.</i>
Sanseviella, <i>Rehb.</i>	[<i>mera, Steud.</i>	Kumara, <i>Medik.</i>	Yucca, <i>L.</i>

SUB-ORDER IV.—ASPHODELEÆ.

Perianth tubular or six-parted. Stamens inserted in the receptacle or in the tube. Fruit capsular or a berry. Seeds inverted or half-inverted, globose or angular, with a black, crustaceous integument. Embryo straight or curved with the seed.

TRIBE 1. *Hyacintheæ*.—Fruit capsular. Root bulbous.

GENERA AND SYNONYMES.

Muscari, <i>T.</i>	Agrophis, <i>Link.</i>	Cyanotris, <i>Raf. ms.</i>	Strangweia, <i>Bert.</i>
Botryanthus, <i>Kth</i>	Lachenalia, <i>Jacq.</i>	Scilla, <i>L.</i>	Barnardia, <i>Lindl.</i>
Litanthes, <i>Hav.</i>	Cœlanthus, <i>W.</i>	Urginea, <i>Steinh.</i>	Ledebouria, <i>Roth.</i>
Bellevallia, <i>Lap.</i>	Peribœa, <i>Kunth.</i>	Stellaris, <i>Mön.</i>	Allium, <i>L.</i>
Hyacinthus, <i>L.</i>	Polyxena, <i>Kunth.</i>	Squilla, <i>Nees.</i>	Mönchia, <i>Medik.</i>
Eriobotrys, <i>Fenzl.</i>	Drimia, <i>Jacq.</i>	Ornithogalum, <i>Lk.</i>	Saturnia, <i>Mar.</i>
Veltheimia, <i>Gled.</i>	Drimiopsis, <i>Lindl.</i>	Chlorogalum, <i>Lndl.</i>	Gethioides, <i>Col.</i>
Uropetalum, <i>Ker.</i>	Idothea, <i>Kunth.</i>	Albuca, <i>L.</i>	Porrum, <i>T.</i>
Pollemannia, <i>Berg</i>	Massonia, <i>L.</i>	Myogalum, <i>Lk.</i>	Cepa, <i>T.</i>
Zuccagnia, <i>Th.</i>	Daubenya, <i>Lindl.</i>	Albucca, <i>Rehb.</i>	Scorodoprasum,
Dipcadi, <i>Mön.</i>	Encomis, <i>Herit.</i>	Honorius, <i>Gray.</i>	[<i>Michel.</i>
Nolina, <i>Rich.</i>	Basilica, <i>Juss.</i>	Puschkinia, <i>Adams.</i>	Nectaroscordum,
Nolinea, <i>Pers.</i>	Camassia, <i>Lindl.</i>	Adamsia, <i>W.</i>	[<i>Lindl.</i>

TRIBE 2. *Anthericæ*.—Fruit capsular. Root fibrous or tuberous.

GENERA AND SYNONYMES.

Zephyra, <i>Don.</i>	Asphodelus, <i>L.</i>	Allobrogia, <i>Tratt.</i>	Simethis, <i>Kunth.</i>
Cummingia, <i>Don.</i>	Asphodeloides,	Liliasrum, <i>Lk.</i>	Thysanotus, <i>R. Br.</i>
Conanthera, <i>R. & P.</i>	[<i>Mön.</i>	Bulbinella, <i>Kth.</i>	Chlamysporum,
Pasithea, <i>Don.</i>	Bidwillia, <i>Herb.</i>	Trachyandra, <i>Kth.</i>	[<i>Sal.</i>
Echeandia, <i>Orteg.</i>	Asphodeline, <i>Rehb.</i>	Arthropodium, <i>R Br</i>	Cæsia, <i>R. Br.</i>
Tulbaghia, <i>L.</i>	Chrysobactron,	Dichopogon, <i>Kth.</i>	Chloopsis, <i>Blume.</i>
Sowerbæa, <i>Sm.</i>	[<i>Hook. f.</i>	Chlorophytum, <i>Ker.</i>	Tricoryne, <i>R Br.</i>
Ancmarrhena, <i>Bng.</i>	Hemerocallis, <i>L.</i>	Hartwegia, <i>Nees.</i>	Clara, <i>Kunth.</i>
Eremurus, <i>Bieb.</i>	Cyanella, <i>L.</i>	Trichopetalum, <i>Lndl</i>	Herreria, <i>R. & P.</i>
Henningia, <i>Kar.</i>	Anthericum, <i>L.</i>	Bottionæa, <i>Colla.</i>	Eriospermum, <i>Jacq.</i>
Ammohirion, <i>Kar.</i>	Phalangium, <i>Juss</i>	Stypandra, <i>R. Br.</i>	

TRIBE 3. *Asparagææ*.—Fruit a berry. Root tuberous or fibrous.

GENERA AND SYNONYMES.

Dianella, <i>Lam.</i>	Myrsiphyllum, <i>W.</i>	Convallaria, <i>Desf.</i>	Evallaria, <i>Neck.</i>
Diana, <i>Comm.</i>	Cordyline, <i>Comm.</i>	Sandersonia, <i>Hook.</i>	Bifolium, <i>Fl. W.</i>
Excremis, <i>W.</i>	Charlwoodia, <i>Sw.</i>	Brachypetalum,	Clintonia, <i>Raf.</i>
? Duchekia, <i>Kost.</i>	Calodracon, <i>Planch.</i>	[<i>Nutt.</i>	Sigillaria, <i>Raf.</i>
Rhuacophila, <i>Bl.</i>	Cohnia, <i>Knth.</i>	Asteranthemum,	Tovaria, <i>Neck.</i>
Eustrephus, <i>R. Br.</i>	Dracæna, <i>Vaud.</i>	[<i>Kth.</i>	Luzuriaga, <i>R. & P.</i>
Geitonoplesium, <i>A.</i>	Störkia, <i>Crtz.</i>	Jocaste, <i>Kunth.</i>	Callixine, <i>Comm.</i>
[<i>Cunn.</i>	Edera, <i>Crtz.</i>	Medora, <i>Kunth.</i>	Enargea, <i>Sol.</i>
Luzuriaga, <i>R. Br.</i>	Tætsia, <i>Medik.</i>	Smilacina, <i>Desf.</i>	Ruscus, <i>T.</i>
Asparagus, <i>L.</i>	Drymophila, <i>R. Br.</i>	Majanthemum,	Danaida, <i>Lk.</i>
Asparagopsis, <i>Kth.</i>	Polygonatum, <i>T.</i>	[<i>Mön.</i>	Danaë, <i>Medik.</i>
Oncus, <i>Lour.</i>	Axillaria, <i>Raf.</i>	Unifolium, <i>Hall.</i>	Semele, <i>Kth.</i>

SUB-ORDER V.—APHYLLANTHÆÆ.

Flowers with a glumaceous spathe. Perianth six-parted, with a spreading limb.

GENERA AND SYNONYMES.

<i>Alania</i> , <i>Endl.</i>	<i>Daviesia</i> , <i>Lam.</i>	<i>Johnsonia</i> , <i>R. Br.</i>
<i>Laxmannia</i> , <i>R. Br.</i>	<i>Baumgartenia</i> , <i>Sp.</i>	<i>Xanthorrhæa</i> , <i>Sm.</i>
<i>Borya</i> , <i>Labill.</i>	<i>Aphyllanthes</i> , <i>T.</i>	<i>Arnocrinum</i> , <i>Endl.</i>

SUB-ORDER VI.—WACHENDORFÆÆ.

Perianth six-parted. Stamens three, inserted in the bases of the three inner divisions of the perianth. Fruit a capsule.

GENERA AND SYNONYME.

<i>Hagenbachia</i> , <i>Nees.</i>	<i>Wachendorfia</i> , <i>Burm.</i>	<i>Schiekia</i> , <i>Meisn.</i>
<i>Xiphidium</i> , <i>Aub.</i>	<i>Pedilonia</i> , <i>Presl.</i>	<i>Lophiola</i> , <i>Ker.</i>

SUB-ORDER VII.—ASPIDIASTRÆÆ.

Perianth bell-shaped. Stamens inserted in the tube. Stigma radiate.

GENERA AND SYNONYME.

<i>Rhodea</i> , <i>Roth</i>	<i>Aspidistra</i> , <i>Ker.</i>
<i>Tupistra</i> , <i>Ker.</i>	<i>Macrogynæ</i> , <i>L. & O.</i>

SUB-ORDER VIII.—OPHIPOGONÆÆ.

Seeds, when at maturity, germinating in the pericarp and bursting the covering.

GENERA AND SYNONYMES.

<i>Ophiopogon</i> , <i>Ait.</i>	<i>Polygonastrum</i> , <i>Mön.</i>	<i>Bulbospermum</i> , <i>Bl.</i>
<i>Flüggea</i> , <i>Rich.</i>	<i>Liriope</i> , <i>Lour.</i>	<i>Peliosanthes</i> , <i>Andr.</i>
<i>Slateria</i> , <i>Desv.</i>	<i>Sanseviella</i> , <i>Rehb.</i>	<i>Teta</i> , <i>Roxb.</i>

GEOGRAPHICAL DISTRIBUTION.—They are most abundant in the temperate regions of both hemispheres. Between the tropics they assume a gigantic size and an arborescent form.

PROPERTIES AND USES.—These are of a very varied character. The bulbs of Tulips are bitter and acrid, yet those of *Tulipa sylvestris* are eaten in Siberia by the inhabitants. From *T. Gesneriana* all the varieties of garden tulips have been obtained. The tubers of some of the Lilies are also eaten, as those of *Lilium Kamtschacense*, *L. martagon*, and *L. pomponium*, in Siberia. Thunberg states that, in China, the dried scales of *L. japonicum* are considered nourishing and useful in diseases of the chest, as a substitute for salep. The *White Lily* (*L. candidum*), so well known in gardens for its gay flowers and powerful fragrance, is a native of Syria and Asia Minor. The bulb contains a great deal of mucilage, and an acridity, but the latter it loses by drying, roasting, or boiling; when cooked, it is viscid, pulpy, sweet, and sugary, and is eaten by many people in the East.

Boiled with water or milk, it forms a good emollient poultice, much used in popular practice. The petals communicate their fragrance to almond or olive oil by maceration, and to lard, of which the perfumers take advantage and preserve it in pomatums and other articles of a similar nature. The bulbs of *Erythronium americanum* are emetic in doses of twenty-five and thirty grains; and those of *Dog's-tooth Violet* (*E. dens canis*) are eaten in Siberia. Clusius asserts that the women in Styria mix them with their children's food to drive away worms, against epilepsy and cholera. Lobel says they are aphrodisiacs. The bulbs of *Fritillaria imperialis*, or *Crown Imperial*, have a very fetid odour, like that of a fox, and they are powerfully acrid, and poisonous—even the honey that distils from the flowers is said to be emetic; those of the beautiful *Methonica* (*Gloriosa*) *superba* are also poisonous, and, bruised with grains of paradise, form a poultice, which is applied to sprains in Guiana; the leaves are astringent. The delightfully fragrant *Tuberose* (*Polianthes tuberosa*) is a native of Persia and India, and is cultivated in the south of France and in Italy in the open air, but in this country requires protection. It is said that the plant emits its scent most strongly after sunset, and has been observed in a sultry evening, after thunder, when the atmosphere was highly charged with the electric fluid, to dart small sparks of lucid flame in great abundance from such of its flowers as were fading. The odour of the flowers is very powerful, and, when confined in rooms, will even cause asphyxia and headache; this odour is extracted by perfumers, and employed in various departments of their trade. The bulbs are acrid and emetic.

The Aloes contain a great quantity of bitter, resinous juice, which flows from the fleshy leaves, and, becoming concrete, furnishes the various drugs of that name. *Cape Aloes* is produced by various species growing at the Cape of Good Hope, the most important being *Aloë spicata*, although *A. ferox*, *A. africana*, and *A. plicatilis*, also furnish a certain portion of inferior quality. The article is collected by the Hottentots and the Dutch boers, who make a hole in the ground in which they spread a sheep's skin with the smooth side upwards; the leaves are cut off the stem and ranged round the side of the hole, the cut ends inwards, and the juice that runs out is received in the skin; in warm weather it flows very freely. When sufficient has been collected it is evaporated in iron pans, and when sufficiently concentrated is poured into boxes or skins. *Aloë spicata*, from which the greater portion of this substance is obtained, is three to four feet high, with a stem three inches in diameter, and thick, fleshy leaves two feet long. The species supposed to yield *Socotrine Aloes* is *A. socotrina*, but some doubt still exists as to the true source; it is, however, well known that this plant grows abundantly on the island of Socotra, and about the Straits of Babelmandel, whence the supplies of the drug are obtained. The preparation is much the same as is practised at the Cape, but instead of being evaporated in iron pans by the aid of artificial heat, it is said to be performed by exposure to the sun. *Barbadoes Aloes* is procured from *A. vulgaris*; but *A. socotrina*, *A. purpurascens*, and *A. arborescens*, are also cultivated for the purpose. This variety of the drug is obtained either by boiling the juice to a proper consistence, or by chopping up the leaves and forming a decoction with water, which is afterwards evaporated; in either case, when the proper consistence has been obtained, the substance is poured

into calabashes and allowed to concreate. A superior variety has been got by the spontaneous exudation and inspissation of the juice. It is not known from what source *Hepatic Aloes* are derived. They are sent from Arabia into India, and thence exported to this country; but there is some reason to suppose that they are an inferior variety of Socotrine. The composition of a pure specimen of 100 parts of Socotrine Aloes consists of 85 of a bitter extractive substance called *aloesin*; 2 of ulmate of potassa; 2 of sulphate of lime; 0.25 of gallic acid; 8 of albumen and traces of carbonate of potassa, carbonate of lime, and phosphate of lime. Aloysin is very soluble in water and alcohol, but slightly soluble in ether, and quite unaltered in the fixed and volatile oils; and it possesses in an eminent degree the bitter taste and purgative property of aloes. Aloes is one of the most valuable remedies, being tonic, gently aperient, or purgative, according to the dose. In small doses it is tonic, promotes digestion, and is generally thought to increase the secretion of the liver; it acts chiefly on the large intestines, and often occasions considerable irritation of the rectum, and it also stimulates the uterus and its appendages, acting with an emmenagogue effect.

Aloë dichotoma is a native of the Cape of Good Hope, where it grows in great abundance and to an immense size. Paterson states that he measured one twelve feet in circumference and twenty feet high; and that he had seen some about four hundred feet round the extremities of the branches, which extend themselves in the form of a crown. This plant is called *Koker boem*, or *Quiver Tree*, from the use to which it is commonly applied by the natives. The pulp of the leaves of *A. littoralis*, a native of India, after being washed in cold water and mixed with sugar candy, is prescribed as cooling; and mixed with burnt alum, it forms, in the estimation of the native practitioners, an excellent ophthalmic when applied to the eyes in a piece of muslin. *A. perfoliata* is said to furnish the *Caballine Aloes* of Jamaica. In Cochin China, the leaves are macerated in aluminous water and afterwards in cold water, and then a fecula of agreeable taste, and without medicinal properties, is extracted from them, which is used as food with sugar. It is this species which is cultivated in the south of Europe. The native practitioners of Ceylon prescribe the extract of the bulbs of *Sansevieria zeylanica* in consumption and chronic catarrh. From this a very strong fibre is obtained in Africa and India, known by the name of *African Hemp*, *Bowstring Hemp*, or *Moorva fibre*.

The plant producing *New Zealand Flax* is *Phormium tenax*, which grows abundantly in all those islands. Its leaves all proceed directly from the root, are five or six feet long and two to three inches wide, in appearance like those of an iris, and when cut exude a viscid juice, which, when it dries, becomes like gum. The roots are bitter, and the native mothers rub their nipples with them when they want to wean their children. They are said to be an excellent substitute for sarsaparilla, acting as a purgative, diuretic, sudorific and expectorant. The fibre furnished by the leaves rivals in strength the finest hemp, and a common preparation of it is employed by the natives for their ordinary apparel, strings, lines, cordage, and netting of every description; but by another process it is obtained in long, slender threads, which shine like silk and are as white as snow, and with which they make their finest cloths. The plant endures the climate of the southern

counties of England, and it has even been attempted to be cultivated in Ireland, but the fibre produced was inferior to that imported from New Zealand, and hence, we believe, the idea of making it an object of profitable speculation has been abandoned. The *Yuccas* also yield a fibre, but it is of no commercial value.

The bulb of *Urginea maritima* forms the *Squill* of the druggists. The plant grows on the sea-shore of almost all the countries bordering on the Mediterranean. These bulbs are from the size of a man's hand to that of a child's head, and contain a viscid, acrid juice, which is so volatile, that in taking one to pieces the vapour rising irritates the nose and eyes, and the action of the juice causes blisters on the fingers if the operation is continued too long. The bulbs are collected in autumn, for then they possess most of their acidity; in spring they are rather sugary. They are pulled to pieces in scales, and the scales strung on cords and hung in the sun to dry; the drying is afterwards completed in an oven, and they are packed for use. By the analysis of Vogel squill contains an acrid volatile principle, which is decomposed at a temperature of boiling water; 6 of gum; 35 of a bitter viscid principle, called *scillitin*; 24 of tannin; 5 of citrate of lime and sugary matter; 30 of ligneous fibre. Taken internally the preparations of squill are nauseant, expectorant, diaphoretic, and diuretic; in large doses emetic and purgative. They are chiefly used in chronic catarrh, asthma, croup, and whooping-cough. The bulbs of *Scilla lilio-hyacinthus* are used as a purgative by the inhabitants of the Pyrenees. The seeds of *Muscari comosum*, when reduced to powder and taken into the nostrils, are acrid and pricking. On some parts of the continent it is common in corn-fields, and the seeds getting mixed with the grain, give to the bread a pungent, disagreeable, and very bitter taste. The tubers of *Hyacinthus non-scriptus* contain a very large quantity of mucilage, which, De Candolle suggests, might be put to some economic purpose. The bulbs of *Camassia esculenta* are eaten by the North American Indians, under the name of *Quamash*.

In the genus *Allium* we meet with some familiar plants, as the Onion, Leek, Garlic, and Shallot. The species are very numerous, and all possess more or less of a volatile and acrid penetrating principle, pricking the thin transparent membrane of the eyelids, and being very similar in their properties, one may supply the place of the other, for all are irritant, excitant, and vesicant; in all the species the bulb is the most active part. The *Onion* (*Allium cepa*) is thought to have come originally from India, through Egypt, where it became an object of worship; it was then transmitted to Greece, thence to Italy, and ultimately it was distributed throughout Europe, in almost every country of which it has been cultivated from time immemorial. Onions cultivated in warm countries are less acrid and much sweeter than those of colder climates, and it is not at all unusual to see a Spanish peasant eating an onion as we would an apple; those large Spanish onions which are imported to this country during the winter months are, when properly roasted, perfectly sweet, and equal to many preserves. The Onion contains a white, acrid, volatile oil, holding sulphur in solution; albumen; much uncrystallisable sugar and mucilage; phosphoric acid, both free and combined with lime; acetic acid; citrate of lime; and lignin. Of all the species of *allium*, the Onion possesses the volatile principle in the highest degree, and hence it is impossible to separate the scales of

the root without the eyes being affected; the juice is sensibly acid, and has the reputation of dissolving calculus in the bladder, is capable of being converted into vinegar by fermentation, and, mixed with water or the dregs of beer, yields, by distillation, an alcoholic liquor. The Onion is stimulant, diuretic, expectorant, and rubefacient; although used as a common esculent, it is not suited to all stomachs; there are some who cannot eat onions when fried or roasted, who can digest them boiled, and this is the best mode of using them, as by boiling they are deprived of their essential oil. When taken in moderation they increase appetite and promote digestion; but when taken in large quantities they occasion flatulence, gastric uneasiness, and feverish excitement. The pulp of roasted onions, with oil, forms an excellent anodyne and emollient poultice to suppurating tumours. The *Leek* (*A. porrum*), like the rest of the species, contains an essential oil, which it loses in boiling; this is well known as an ingredient in soups. It is gently stimulating, with a peculiar direction to the kidneys.

Garlic (*Allium sativum*) is a native of Sicily. Its alliaceous principle is less volatile than that of the Onion, and less pricking to the eyes; but its odour is more powerful and diffusible. When eaten, the breath, perspiration, eructations, and even wounds, evolve its odour; and it has been observed that, if applied to the surface of the skin, or given in a lavement, the effect is the same. The peculiar smell and taste, though strongest in the bulb, are found to a greater or less extent in all parts of the plant, and they depend on an essential oil, which is very volatile, obtained by distillation; one hundredweight of garlic yields about three or four ounces of this oil, which has an extremely pungent odour, and strong acrid taste, and when applied to the skin produces much irritation and sometimes even blisters. Besides this oil, garlic contains in 1406 parts, 520 of mucilage, 37 of albumen, 48 of fibrous matter, and 801 of water. The fresh bulbs yield, on pressure, nearly a fourth part of juice, which is highly viscid, and so tenacious as to require dilution with water before it can be easily filtered; when dried it serves as a lute for porcelain. Garlic excites the appetite, stimulates the action of the stomach, facilitates digestion, and dispels flatulence. Its effects on the system are those of a general stimulant; it quickens the circulation, excites the nervous system, promotes expectoration, is diaphoretic and diuretic according as the patient is kept warm or cool, and acts on the stomach as a tonic and carminative. Bruised and applied to the feet, it acts very beneficially as a revulsive in disorders of the head; its juice, mixed with oil, or the garlic itself bruised and steeped in spirits, is frequently used as a liniment in infantile convulsions; a clove of garlic, or a few drops of the juice introduced in the ear, are said to prove highly efficacious in atonic deafness; and the bulb, bruised and applied in the shape of a poultice above the pubes, has sometimes restored action to the bladder, in cases of retention of the urine from debility of that organ. In Sumatra a stimulant leaf, rubbed with garlic, is applied as a vesicatory, and the root itself is employed in lavements as stimulant and vermifuge, particularly in cases of ascarides in the rectum. The bulbs of the *Shallot* (*A. ascalonicum*) is used in cookery, and its taste and odour are not so strong as they are in the garlic; those of *Rocambole* (*A. scorodoprasum*) are used in the same way, and they are sweeter than those of Shallot, being indeed almost sugary. The leaves of *Chives* (*A. schænoprasum*) are used in salads and sauces. A.

ursinum and *A. vineale* communicate their flavour to the milk of cows, sheep, and goats that feed on them, and even the butter and cheese have the same disagreeable taste.

The bulbs of some species of Asphodels contain so much fecula as to render them eatable, when deprived of their bitter resinous juice by boiling. Those of *Asphodelus ramosus* were eaten by the ancients, who planted them near tombs, under the belief that the spirits of the dead lived on them also. In Barbary the wild boars eat them greedily, and in hunting for them they turn up large spaces of ground, rendering it fertile by this mode of ploughing. In Persia they make glue with tubercles of the plant, by first drying and then pulverising them; when mixed with cold water the powder swells, and forms a very strong glue. The peasantry in some parts of France use a decoction of the roots of *Anthericum bicolor* as a purgative. The flowers of *Heimerocallis* were formerly considered cardiacæ. The roots of *Talbaghia*, boiled with milk, are considered useful in phthisis. The *Grass Tree* of Australia (*Xanthorrhœa hastilis*) has a stem like a palm, not above four feet high, and a foot in diameter, with a head formed of long grassy leaves, which spread out and hang down in elegant curves. The plant is of remarkably slow growth, and before one attains the height just mentioned it is supposed that many centuries must have elapsed; perhaps it would not be too much to say that such a plant is as old or older than the commencement of the Christian era. There are several species found in the Swan River Colony, where they are used as fodder for all kinds of cattle. The natives beat off the heads of these plants with a large stick, strip off the outer leaves, and cut away the inner ones, leaving about an inch and a half of the white tender portion joining the trunk; this portion they eat raw or roasted, and it is far from disagreeable in flavour, having a milky, balsamic taste. The base of the leaves of *X. humilis* are used as food. All the species abound in a resinous juice, which becomes concrete on exposure to the air; it is reddish-yellow, inodorous, has a shining fracture, and is not unlike gamboge, but does not colour the saliva. It is said that, dissolved in spirits of wine, it acts as a tonic and corroborant in diarrhœa, dysentery, and intestinal colic. The natives of Australia use it for uniting the edges of cuts and wounds, but particularly to make a sort of mastic, melted and mixed with absorbent earth, which they use to fasten on their axes, caulk their canoes, and other such appliances. It contains a great quantity of resin, gum, benzoic acid, and a very acrid, volatile oil, of an agreeable odour; it appears to partake more of the nature of a balsam than a resin, and has some resemblance to propolis.

The well-known *Asparagus* (*Asparagus officinalis*) also belongs to this extensive and variously-featured family. It is a native of great Britain, and is found on various parts of the sea coast, and in the fens of Lincolnshire; at Kynance Cove, in Cornwall, there is an island called "Asparagus Island," from the abundance in which it is there found. The uses to which the young shoots are applied, and the manner in which the plant is cultivated to obtain them in the highest excellence, are too well known to be noticed here. *Asparagus* is not only a wholesome and nutritious vegetable, but it acts as a diuretic, aperient, and deobstruent; shortly after being eaten it has a marked effect on the urine, which is much increased in quantity, and to which a disagreeable odour is communicated. The chemical analysis of

the juice of asparagus discovers its composition to be a peculiar crystallisable principle called *asparagin*, albumen, mannite, malic acid, and some salts. The root was formerly given in decoction as a diuretic, aperient, and purifier of the blood. Thouars says that the cellular tissue contains a substance similar to sago. The berries are capable of undergoing the vinous fermentation, and affording alcohol by distillation; in their unripe state they possess the same properties as the roots, and probably in a much higher degree. In India the roots of *A. sarmentosus*, boiled in milk, are eaten; the infusion is used to diminish the eruptions of the smallpox, and to prevent them becoming confluent; in Malabar the shoots of this species are preserved in sugar, and given in heated fevers and consumption. The ancients ate the shoots of *A. acutifolius*, which they called *corvuda*; those of *A. racemosus* and *A. adscendens* are both employed medicinally in Northern India, those of the latter being considered a good substitute for saleg. The bruised roots of *Dianella odorata*, along with other aromatics, are made into pastils, and used for fumigating in India; a decoction of the root is used in dysuria, gonorrhœa, and fluor albus.

The *Dragon Tree* (*Dracæna draco*) grows to an immense size, a specimen in the Canaries being seventy feet high and forty-five feet in circumference at the base. It yields a red, resinous juice, which, becoming concrete, forms a kind of Dragon's Blood. *Cordylone Ti* (*Dracæna terminalis*) grows in India, China, and the Islands of the Pacific Ocean, and attains the height of ten or twelve feet; and to the Polynesians is of great importance. The root-stock, when fresh, is yellowish-white, hard, fibrous, and almost insipid, but when baked becomes soft, agreeably sweet, and has a rich saccharine juice; it is then partly eaten as food, and partly manufactured into beer and spirit. The leaves supply excellent fodder for cattle, form durable coverings for the roofs and sides of houses, and were formerly woven with their stalks into short eldaks, which the natives used in their mountain journeys. The plant forms excellent hedges by merely sticking its trunkcons in the ground, where they soon take root; in former times its leaves were always an emblem of peace, and, along with the plantain, a substitute for a flag of truce. The sugary juice of the root-stock, when evaporated, furnishes very good sugar, and the spirit distilled from it in the Sandwich Islands bears the name of *Ava*, as does that made from the root of *Macropiper methysticum*.

The *Lily of the Valley* (*Convallaria majalis*) is too well known to require any description, and its delightful fragrance and lovely forms are so familiar to the mind of every one, that they do not require even to be suggested. The flowers are esteemed cephalic, strengthening to the brain and nerves, but as their odour is strong they become dangerous in closed apartments, particularly in sleeping-rooms; dried and pulverised, they are said to be emetic and purgative, the dose of half a drachm acting violently; in powder they form an excellent sternutatory, and may be taken as a substitute for snuff, for which it has been recommended as having all the advantages and none of the evils of the narcotic herb. The root, like the flowers, has a bitter taste, and is possessed of the same properties; the distilled water, called *Eau d'Or*, is supposed to reanimate the vital powers. *Solomon's Seal* (*C. polygonatum*), as well as the *Lily of the Valley*, is a native of Britain; its young shoots may be eaten like asparagus. The root, which is inodorous

and has a sweetish, mucilaginous taste, followed by some bitterness and acrimony, is said to be emetic, and it has been recommended as a remedy in gout and rheumatism. In former times it was used externally in bruises, especially about the eyes, in tumours, wounds, and cutaneous eruptions, and its juice and distilled water were highly esteemed as a cosmetic; gathered during the time of flowering, dried, and given in powder in doses of thirty-six grains, it is a popular preventive, in Russia, against hydrophobia. The berries are emetic, purgative, and, according to some, poisonous. The berries of *Smilacina racemosa*, a native of North America, are believed to be nervo-tonic. The *Butcher's Broom* (*Ruscus aculeatus*) has the singular property of producing its flower on the leaf, and from this circumstance botanists hold that the flat, leaf-like body is not a leaf but a flattened branch. In Greece the young shoots are eaten like asparagus; the root is slightly aperient, and has been used in dropsy, retention of urine, and diseases of the urinary passages. The fruit is a red berry containing hard seeds, which in Corsica are roasted and used as coffee, to which, it is said, they have some resemblance in taste. In Italy branches of this shrub are used to cover food from mice, the sharp prickles of the leaves acting as an effectual barrier, and hence the plant is called *Pongilopi*, signifying prick-mouse. It is called *Butcher's Broom*, from the green shoots being tied in small bundles and used by butchers for sweeping their blocks; it is also used in London by the cigar manufacturers for sprinkling the saline liquor over the tobacco leaves. *R. hypoglossum* has the same properties as *Butcher's Broom*.

ORDER CCXVII.—MELANTHACEÆ—COLCHICUM FAMILY.

THIS family is distinguished from the Lily order by its carpels separating into three parts, and its anthers turned outwards. The flowers are sometimes polygamous. Perianth with six petal-like divisions. Stamens six; anthers turned outwards. Ovary three-celled, three-parted. Fruit a capsule, three-valved, opening either through the partitions or through the cells. Seeds with dense fleshy albumen and a very minute embryo.

GENERA AND SYNONYMES.

<i>Tofieldia</i> , <i>Huds.</i>	<i>Sabadilla</i> , <i>Brutt.</i>	<i>Lichtensteinia</i> , <i>W</i>	<i>Compsanthus</i> , <i>Sp.</i>
<i>Narthecium</i> , <i>Ger.</i>	<i>Schœnocaulon</i> , <i>A.Gr</i>	<i>Cymation</i> , <i>Sp.</i>	<i>Disporum</i> , <i>Sal.</i>
<i>Helonias</i> , <i>W.</i>	<i>Amiantium</i> , <i>A.Gr.</i>	<i>Anguillaria</i> , <i>R. Br.</i>	<i>Drapiezia</i> , <i>Bl.</i>
<i>Heritiera</i> , <i>Schrk.</i>	<i>Amiantanthus</i> ,	<i>McLanthium</i> , <i>L.</i>	<i>Lethea</i> , <i>Noronh.</i>
<i>Isidrogalvia</i> <i>R&P</i>	[<i>Kth.</i>	<i>Dipidax</i> , <i>Laws.</i>	<i>Prosartes</i> , <i>Don.</i>
<i>Hebelia</i> , <i>Gmel.</i>	<i>Cyanotris</i> , <i>Raf.</i>	<i>Androcymbium</i> , <i>W.</i>	<i>Hekorima</i> , <i>Raf.</i>
<i>Conradia</i> , <i>Raf.</i>	<i>Chrosperma</i> , <i>Raf.</i>	<i>Cymbanthes</i> , <i>Sal.</i>	<i>Streptopus</i> , <i>Rich.</i>
<i>Leptilix</i> , <i>Raf.</i>	<i>Veratrum</i> , <i>T.</i>	<i>Wurmbea</i> , <i>Th.</i>	<i>Monocaryum</i> , <i>R.Br.</i>
<i>Pleca</i> , <i>Rich.</i>	<i>Stenanthium</i> , <i>A.Gr</i>	<i>Bœometra</i> , <i>Sal.</i>	<i>Bulbocodium</i> , <i>L.</i>
<i>Isophysis</i> , <i>T.Moore.</i>	<i>Antielea</i> , <i>Kunth.</i>	<i>Kolbea</i> , <i>Schlecht.</i>	<i>Geophila</i> , <i>Berg.</i>
<i>Howardia</i> , <i>Hook.</i>	<i>Zygadenus</i> , <i>Rich.</i>	<i>Jania</i> , <i>Schult. f.</i>	<i>Colehium</i> , <i>T.</i>
<i>Xerophyllum</i> , <i>Rich.</i>	<i>Leimanthium</i> , <i>W.</i>	<i>Schelhammera</i> <i>R Br</i>	<i>Weldenia</i> , <i>Schult.</i>
<i>Helonias</i> , <i>L.</i>	<i>Burchardia</i> , <i>R. Br.</i>	<i>Kreysigia</i> , <i>Rehb.</i>	<i>Leucoerinum</i> ,
<i>Abalon</i> , <i>Ad.</i>	<i>Erythrostictus</i> ,	<i>Tripladenia</i> , <i>Don.</i>	[<i>Nutt.</i>
<i>Ophiostachys</i> , <i>Del</i>	[<i>Schlecht.</i>	<i>Uvularia</i> , <i>L.</i>	<i>Geanthea</i> , <i>Raf.</i>
<i>Declinothrys</i> , <i>Raf</i>	<i>Ornithoglossum</i> , <i>Sal</i>	<i>Tricyrtys</i> , <i>Wall.</i>	<i>Lettonia</i> , <i>Hook.</i>
<i>Asagracea</i> , <i>Lindl.</i>			

These are distributed over almost the whole world, and are most abundant in temperate climates. They are eminently poisonous, and are possessed of acrid, emetic, purgative, and narcotic properties.

From *Asagraea officinalis* it is generally supposed that the drug called *Cevadilla*, or *Sabadilla*, is obtained; it is the seeds of the plant, and has been employed in Europe for nearly three centuries as an anthelmintic, and in powder for destroying vermin in the hair; but the principal use made of it is for the preparation of *veratria*, of which it contains 58 parts in 100. The plant is a native of the mountains of Mexico, where the seeds are used by the inhabitants against hydrophobia. There is still a doubt as to the real origin of *Sabadilla*, and by some it is supposed that it is produced by another plant belonging to the same family, called *Veratrum sabadilla*, also a native of Mexico and the West Indies. *White Hellebore* (*Veratrum album*), a native of the Alps and Pyrenees, is a violent emetic and cathartic. Applied externally on wounds and ulcers, it causes gripping pain in the bowels, and sometimes violent purging; snuffed up the nostrils, it produces great irritation with violent sneezing, and its use in this way being attended with danger, great caution should be observed in whatever way it is used. The leaves, reduced to powder, have been long employed by gardeners as an effectual remedy against the gooseberry caterpillar. *V. viride* has the same properties as the preceding, and, in addition, is said to increase most of the secretions, and, when freely taken, to exercise a powerful influence over the nervous system. It is called, in the United States, *Indian Poke*, *Poke Root*, and *Swamp Hellebore*. *Stenanthium frigidum* is a native of Mexico, and a decided poison, stupefying horses that feed upon it. The virtues of these plants reside in a principle called *veratria*, which is a whitish, colourless powder, without smell, acrid, and causing numbness and tingling when placed on the tongue. In its effects it is stimulating, diuretic, and occasionally cathartic, and has been used internally in gout, rheumatism, dropsy, and many other diseases. The root of *Hellonias dioica*, called in America *Blazing Star* and *Starwort*, is extensively employed as an anthelmintic; when chewed, it causes salivation, vomiting, and nausea, and infused in wine it forms a tonic bitter; it has been found of particular advantage in atony of the generative organs. A decoction of the root of *H. bulbata* is administered in obstruction of the bowels. The seeds of *Ami-anthium muscatoxicum* are narcotic, and are used for destroying flies, hence the plant is called in the United States *Fly-poison*. The roots of *Ledebouria hyacinthoides* are used in India as a substitute for squill. The roots of *Uvularia latifolia* and *U. flava* are mucilaginous, slightly astringent, and used by the Americans in gargles, and those of *Streptopus amplexifolius* are employed for the same purpose. The leaves and root of *U. grandiflora* is a celebrated remedy, among the North American Indians, against the bite of the rattlesnake.

One of the most poisonous plants of the whole family is *Meadow Saffron* (*Colchicum autumnale*), from its powerfully acrid, narcotic properties; and when we state that from three to nine grains of the dried bulb is a full medicinal dose, it should be used with extreme caution. Numerous instances are recorded where individuals, and even whole families, have been poisoned by the accidental substitution of these bulbs for others of an alimentary description. The plant grows in many parts of Britain, and is plentiful in

the meadows in Essex, Suffolk, Oxfordshire, and Cheshire. The leaves appear in the spring and die away before summer, and in the autumn the flowers appear in September and October; the fruit does not make its appearance till the spring, when they rise to the surface on a stem. The bulbs, or corms, are matured for medicinal purposes from the end of June to the middle of August, and are gathered for use between these periods, which seems to be the time when they possess their greatest activity; and it may have been on account of the different seasons that the bulbs were collected that different opinions have been entertained with regard to their virtues, some authors denying that they have any acrimony. But there are too many instances on record to the contrary to admit of any doubt on this point. In the village of Schorren, in the canton of Berne, a number of children died from eating the seeds, and fowls die from the same cause. Two boys, after eating the bulbs they found in a meadow, died in the greatest agony; and ten or twelve years ago a woman was poisoned by the sprouts which had been thrown away in Covent Garden Market, and which she had mistaken for onions. Baron Störck asserts that, on cutting the fresh root into slices, the acrid particles emitted from it irritated the nostrils, fauces, and breast; and that the ends of the fingers by which it had been held became for a time benumbed; that even a single grain in a crumb of bread, taken internally, produced a burning heat and pain in the stomach and bowels, urgent strangury, tenesmus, colic pains, headache, and hiccough. The Turks infuse the flowers in wine to add to its inebriating effects; and in autumn the peasantry of Carniola eat the bulbs with impunity. The constituents of Colchicum are a vegetable alkali called *colchicia*, with an excess of gallic acid; a fatty matter composed of olein, stearin, and a peculiar volatile acid analogous to the cecadic; a yellow colouring matter; gum; starch; inulin, in large quantity; and lignin. Administered medicinally, Colchicum is prescribed in dropsy, humoral asthma, gout, rheumatism, and various disorders of the gall-duct and the nerves. What are sold in druggist's shops under the name of *Hermodactyls*, for soothing rheumatic pains, are supposed to be the bulbs of *C. variegatum*, a native of the south of Europe and the Levant.

ORDER CCXVIII.—GILLIESIACEÆ—GILLIESIA FAMILY.

THIS small family is distinguished from the Lilies by its spathaceous flowers, surrounded by a perianthoid involucre. The leaves are grass-like. Perianth minute, either a single lobe, or urecolate, and six-toothed. Stamens six, sometimes three, sterile. Fruit a three-celled, three-valved capsule, bursting through the cells, many-seeded. Seeds attached to the axis; embryo in the midst of fleshy albumen.

GENERA.

Gilliesia, *Lindl.*

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Miersia, *Lindl*

Natives of Chili, and without any properties.

ORDER CCXIX.—COMMELYNACEÆ—SPIDERWORTS.

HERBACEOUS plants, with fibrous roots or tuberous root-stocks. *Leaves* alternate, simple, entire, flat, narrow, and sheathing at the base. *Flowers* hermaphrodite, regular. *Perianth* double, the three outer divisions calyx-like, and the three inner petal-like, generally distinct, and very rarely united at the base. *Stamens* six, rarely three or five by abortion, free, and inserted under the ovary; *anthers* two-celled, turned inwards, bursting, longitudinal, and some of them sometimes sterile and deformed. *Ovary* free, three-valved and three-celled; *ovules* attached to the central column; *style* simple; *stigma* undivided. *Fruit* a capsule, two or three-valved, two or three-celled, bursting through the valves, and the valves bearing the partitions in the middle of their inner surface. *Seeds* few, sometimes solitary, or in pairs by abortion, inserted by their whole side on the inner angle of the cell, whence the hilum is linear. *Embryo* covered with a papilla, and lying half buried in a cavity of densely fleshy albumen, and remote from the hilum.



Fig. 216. *Commelyna scabra*. A, Section of ovary of *Tradescantia virginica*; B, ditto of the seed of ditto.

GENERA AND SYNONYMES.

<i>Commelyna</i> , Dill.	<i>Dithyrocarpus</i> ,	<i>Tinnantia</i> , Scheid.	<i>Zanonia</i> , Pl.
<i>Hedwigia</i> , Medik.	[Kunth.	<i>Tradescantia</i> , L.	<i>Dichorisandra</i> , Mik.
<i>Lechea</i> , Lour.	<i>Palisota</i> , Rich.	<i>Ephemerum</i> , T.	<i>Cartonema</i> , R. Br.
<i>Ananthopus</i> , Raf.	<i>Pollia</i> , Th.	<i>Spironema</i> , Lindl.	<i>Forrestia</i> , A. Rich.
<i>Aneilema</i> , R. Br.	<i>Aclisia</i> , E. Mey.	<i>Cyanotis</i> , Don.	<i>Flagellaria</i> , L.
<i>Aphilax</i> , Sal.	<i>Lamprocarpus</i> , Bl.	<i>Zygomenes</i> , Sal.	<i>Streptolirion</i> , Edgew.
<i>Polyspatha</i> , Benth.	<i>Callisia</i> , Löffl.	<i>Lampra</i> , Benth.	<i>Heteractia</i> , Knze.
<i>Floscopa</i> , Lour.	<i>Hopalanthus</i> Jacq	<i>Campelia</i> , Rich.	<i>Rhizo</i> , Hance.
	<i>Murdannia</i> , Royle.		

GEOGRAPHICAL DISTRIBUTION.—Chiefly natives of the tropics of the whole world; a few occur in Australia, south, and some in America north, of the tropics, but none are found in northern Asia or Europe.

PROPERTIES AND USES.—Few of this family possess any remarkable properties; they abound in mucilage, and are sometimes eaten with bread.

The root-stocks of some contain a great deal of amylaceous matter. From the flowers of *Commelyna communis*, which are of a lovely blue colour, Kæmpfer states that ultramarine is prepared. The plant is employed, both raw and boiled, in Cochin China, as refrigerant, moistening, and loosening; internally, it is prescribed in constipation, strangury, and heat of the bowels; externally, as an emollient in ophthalmia. The tubercles of *C. medica* are anodyne, emollient, pectoral, and hepatic, and are frequently prescribed in coughs, asthma, pleurisy, and dysuria, by the Chinese and Cochin Chinese physicians. The tubercles of *C. tuberosa*, *C. cœlestis*, *C. angustifolia*, and *C. striata*, contain a great quantity of starch, and are sweet and eatable. *C. Rumphii* is esteemed in India as an emmenagogue. The leaves of *Tradescantia diuretica* are employed in Brazil as emollients and saponaceous in baths and lavements for rheumatic pains, and against spasmodic retention of urine. *T. malabarica*, boiled in oil, is administered as a remedy for itch and leprosy in India. *T. virginica* is used in Jamaica against the bites of venomous spiders, and hence it is called *Spider-wort*. The leaves of *Flagellaria indica* are said to be astringent and vulnerary.

ORDER CCXX.—XYRIDACEÆ—XYRIS FAMILY.

THESE are swampy, herbaceous plants, with fibrous roots, sword-shaped or thread-like leaves, sheathing at the base, and flowers in scaly heads. Perianth in six parts, the three outer of which are glumaceous, and the three inner petal-like and united. Stamens six, three fertile, inserted in the perianth; anthers turned outwards. Ovary one-celled, with a marginal ovule-bearer; ovules numerous, orthotropal. Fruit a one-celled, three-valved capsule, many-seeded. Seed with the embryo on the outside of fleshy albumen, distant from the hilum.

GENERA AND SYNONYME.

Xyris, *L.*
Abolboda, *H. & B.*

Chloerum, *W.*
? Acoridium, *Nees.*

Natives of the tropics. The juice of the leaves of *Xyris indica*, mixed with vinegar, is prescribed in India against impetigo; the leaves and the root boiled in oil, and added to a decoction of *Phaseolus mungo*, are employed against itch and leprosy; in Brazil, the juice of *X. vaginata* is used against ringworm and other skin diseases.

ORDER CCXXI.—MAYACACEÆ—MAYACA FAMILY.

THESE are moss-like plants, creeping over damp places, having very narrow, pellucid leaves, and small. white. pink. or violet flowers. They

differ from Spider-worts in their one-celled anthers, and in their carpels being opposite the inner divisions of the perianth. Ovary one-celled, with marginal ovule-bearers. Embryo very minute, in a cavity at the margin of the albumen.

GENUS AND SYNONYMES.

Mayaca, *Aubl.*
Biaslia, *Vand.*

„ Syena, *Schröb.*
Colletia, *Fl. Fl.*

Inhabitants of the marshes of America, from Brazil to Virginia.

ORDER CCXXII.—PHILYDRACEÆ—WATERWORTS.

MARSHY plants, with sword-shaped leaves. Flowers spathaceous, having a perianth of two-leaves. Stamens three, two of which are abortive. Ovary three-valved. Seed with an embryo in the axis of fleshy albumen.

GENERA AND SYNONYME.

Philydrum, *Banks.*
Garciana, *Lour.*

Hetæria, *Endl.*

Natives of New Holland, Cochin China, and China.



ORDER CCXXIII.—JUNCACEÆ—Rushes.

HERBACEOUS perennials, with creeping root-stocks, having a naked or leafy stem, rarely annuals. *Leaves* alternate, sheathing at their base, the sheath sometimes entire, sometimes split the whole of its length, cylindrical, channelled, or laterally compressed, having parallel veins. *Flowers* hermaphrodite, or unisexual by abortion, regular; arranged in panicles, cymes, spikes, or heads, enclosed before opening in the sheath of the last leaf, which forms in them a sort of spathe. *Perianth* six-parted, glumaceous, inferior. *Stamens* six, inserted at the base of the divisions of the perianth; rarely three, when they are inserted at the base of the external divisions; *anthers* two-celled, turned inwards. *Ovary* free, superior, one or three-celled, more or less triangular, containing sometimes three inverted erect ovules, or a great number attached to the inner angle of each cell; *style* simple, surmounted by three stigmas. *Fruit* a one-celled capsule, or three incomplete cells, and three valves, bearing the partitions on their inner surface. *Seeds* three or numerous, ascending, with a thin double covering. *Embryo* minute, included in the dense fleshy albumen, with an inferior radicle next the hilum.



Fig 217. A, Flower of *Juncus articulatus*; B, section of fruit; C, fruit with the persistent perianth.

GENERA AND SYNONYMS.

<i>Luzula</i> , DC.	<i>Abama</i> , Ad.	<i>Xerotes</i> , R. Br.
<i>Luciola</i> , Sm.	<i>Astelia</i> , Banks.	<i>Lomandra</i> , Lab.
<i>Prionium</i> , E. Mey.	<i>Hamelinia</i> , A. Rich.	<i>Kingia</i> , R. Br.
<i>Juncus</i> , DC.	? <i>Funkia</i> , W.	<i>Dasypogon</i> , R. Br.
<i>Distichia</i> , Nees.	<i>Hanguana</i> , Bl.	<i>Bacteria</i> , R. Br.
<i>Rostkovia</i> , Desv.	<i>Rapatea</i> , Aubl.	<i>Calceasia</i> , R. Br.
<i>Marsippospermum</i> , Desv.	<i>Mnasiaum</i> , Schrb.	? <i>Goudotia</i> , Dene.
<i>Cephaloxys</i> , Desv.	<i>Spathanthus</i> , Desv.	<i>Saxo Fredericia</i> , [Schom.
<i>Narthecium</i> , Moehr.	<i>Susum</i> , Bl.	

GEOGRAPHICAL DISTRIBUTION.—Generally inhabitants of the colder regions of the globe, extending even to the arctic circles, but some are also found between the tropics.

PROPERTIES AND USES.—None of these plants are possessed of any valuable properties. The roots of *Luzula campestris* and some Rushes are considered diuretics. An infusion of *Juncus effusus*, with the addition of a little sub-carbonate of potash, is employed in Lithuania against calculus of the bladder; and it is cultivated in Japan for making door-mats. The chief uses to which the plants of this family are employed are in the making of mats, baskets, wicks to candles, and chair-bottoms. *J. conglomeratus*, *J. effusus*, *J. maritimus*, and *J. acutus*, are what are generally used for rush-lights; but the Club Rush, belonging to the family Cyperaceæ, is more commonly used for chair-bottoms than the rushes.

ORDER CCXXIV.—PALMÆ—PALMS.

GENERALLY large trees, with a simple, cylindrical, naked stem. *Leaves*

terminal, very large, stalked, persistent, pinnated, digitate, or fan-like. *Flowers* hermaphrodite, but most frequently unisexual, dioecious, or polygamous, arranged in a great number of long catkins, inclosed, before expansion, in a leathery or sometimes woody spathe. *Perianth* with six divisions, three of which are internal, and three external; in the males they are valvate, and in the females imbricate. *Stamens* six, rarely three, inserted in the base of the perianth. *Ovary* free, composed of three carpels, distinct or united, each with one cell, containing a solitary ovule, and terminated by a style, which is surmounted by a stigma. *Fruit* dry or fleshy, frequently a fleshy or fibrous drupe, containing a bony and very hard nut, with one or three-seeded cells. *Seed* with a fleshy, bony, or cartilaginous albumen, sometimes presenting a central or lateral cavity, and penetrated by the seed-covering. *Embryo* very small and cylindrical, placed horizontally in a small lateral cavity. *Albumen* remote from the hilum.

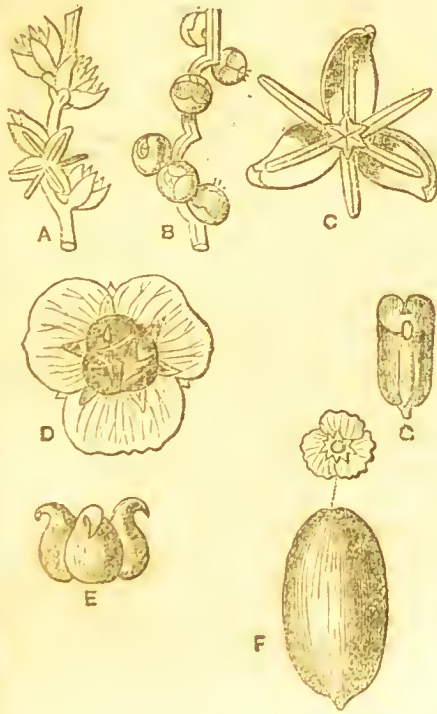


Fig. 218. A, Male flowers of *Phoenix dactylifera*; B, female ditto; C, male flower expanded; D, female ditto; E, ovaries; F, fruit; G, section of seed, showing the embryo.

TRIBE 1. *Areceæ*.—Ovary three-celled (rarely two or one-celled); ovules solitary (very rarely twin), erect, or laterally pendulous. Berry one-seeded (seldom two-seeded); in some species the fruit is a drupe, with one, two, or three one-seeded nuts. Stamens hypogynous. Leaves pinnate or pinnatifid. Flowers sessile. Spathes numerous, rarely wanting.

GENERA AND SYNONYMES.

<i>Chamædorea</i> , W.	<i>Morenia</i> , R. & P.	<i>Euterpe</i> , Mart.	<i>Oncosperma</i> , Bl.
<i>Nunnezharia</i> , R.	<i>Kunthia</i> , H. & B.	<i>Enocarpus</i> , Mart.	<i>Areca</i> , L.
[& P.]	<i>Hyophorbe</i> , Gärt.	<i>Oreodoxa</i> , W.	<i>Euterpe</i> , Gärt.
<i>Nunnezia</i> , W.	<i>Sublimia</i> , Comm.	<i>Pinanga</i> , Rumph.	<i>Dypsis</i> , Noronh.
<i>Hyospathæ</i> , Mart.	<i>Leopoldinia</i> , Mart.	<i>Kentia</i> , Bl.	<i>Scaforthia</i> , R. Br.

Ptycosperma, <i>Lab.</i>	Harina, <i>Ham.</i>	Ceroxylon, <i>H. & B.</i>	Arenga, <i>Lab.</i>
Dryonophloeus,	Orania, <i>Bl.</i>	Cyrtostachys, <i>Bl.</i>	Saguerus, <i>Rumph.</i>
[<i>Zipp.</i>	Wallichia, <i>Roxb.</i>	Calypstrocalyx, <i>Bl.</i>	Gomutus, <i>Rumph.</i>
Orania, <i>Zipp.</i>	Wrightia, <i>Roxb.</i>	Iguanura, <i>Bl.</i>	Caryota, <i>L.</i>
Arausiaca, <i>Bl.</i>	Iriarteia, <i>R. & P.</i>		

TRIBE 2. *Calameæ*.—Ovary three-celled (very rarely two-celled); ovules solitary, erect. Berry one-seeded (very rarely two or three-seeded); fruit-covering formed of leathery, imbricated scales. Stamens hypogynous or perigynous. Stem generally sarmentose and excessively long. Leaves distichous, pinnated, or palmated, the footstalk often terminated in a long tendril; sheath and rachis furnished with prickles. Flowers sessile, arranged in catkin-like spikes, bracteate, spathaceous.

GENERA AND SYNONYMES.

* *Fronde pinnated.*

Calamus, <i>L.</i>	Zalacca, <i>Reinw.</i>	Dæmonorops, <i>Bl.</i>	Raphia, <i>Palis.</i>
Palmijuncus,	Plectocomia, <i>Mart.</i>	Calamosagus, <i>Griff.</i>	Sagus, <i>Gärt.</i>
[<i>Rumph.</i>	Ceratolobus, <i>Bl.</i>	Eugeissona, <i>Griff.</i>	Metroxylon, <i>Rottb.</i>

** *Fronde fan-shaped.*

Mauritia, <i>L. f.</i>	Lepidocaryum, <i>Mart.</i>
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TRIBE 3. *Borasseæ*.—Ovary three-celled (seldom two or four-celled). Ovules ascending or inverted, solitary. Fruit a drupe, with three (seldom one, two, or four,) nuts; sometimes a one-seeded berry. Stamens hypogynous. Leaves fan-shaped or pinnated. Flowers generally diœcious, before expansion embedded in the faveoles of an articulated rachis. Spathes leathery, or almost woody.

GENERA AND SYNONYMES.

* *Fronde fan-shaped.*

Borassus, <i>L.</i>	Lodoicea, <i>Lab.</i>	Hyphæne, <i>Gärt.</i>
Lontarus, <i>Rumph.</i>	Latania, <i>Comm.</i>	Cucifera, <i>Delil.</i>
? Pholidorpus, <i>Bl.</i>	Cleophora, <i>Gärt.</i>	Douma, <i>Lam.</i>

** *Fronde pinnated.*

Bentinekia, <i>Berry.</i>	„ Gynestum, <i>Poit.</i>	Manicaria, <i>Gärt.</i>
Keppleria, <i>Mart.</i>	Vouay, <i>Aub.</i>	Pelophora, <i>Jacq.</i>
Geonoma, <i>W.</i>		

TRIBE 4. *Coryphææ*.—Pistil with three distinct ovaries, seldom a single one or three-celled ovary; ovules erect or inverted, solitary. Fruit composed of three distinct berries (frequently two or only one). Stamens hypogynous or perigynous, in number six, nine, or twelve. Trunk spineless. Leaves fan-shaped or pinnated. Spathes numerous. Flowers sessile, hermaphrodite (seldom unisexual), bracteolate.

GENERA AND SYNONYMES.

Corypha, <i>L.</i>	Bissula, <i>Rumph.</i>	Sabal, <i>Ad.</i>	Trithrinax, <i>Mart.</i>
Taliera, <i>Mart.</i>	Pericycla, <i>Bl.</i>	Chamærops, <i>L.</i>	Rhapis, <i>L. f.</i>
Gembanga, <i>Bl.</i>	Brahea, <i>Mart.</i>	Chamæriphe, <i>[Pont.]</i>	Thrinax, <i>L. f.</i>
Livistona, <i>R. Br.</i>	Copernicia, <i>Mart.</i>	Phoenix, <i>Cav.</i>	Phoenix, <i>L.</i>
Licuala, <i>Rumph.</i>	Caranaiba, <i>Marc.</i>		Elate, <i>Ait.</i>
Saribus, <i>Rumph.</i>	Cryosophila, <i>Bl.</i>		

TRIBE 5. *Cocoeæ*.—Ovary three-celled (rarely two, four, or five-celled); ovules erect or inverted, solitary. Fruit a drupe with a solitary, bony, three-celled nut (two of the cells constantly abortive and seedless), pierced at the summit with three small openings. Covering of the seed more or less adherent to the nut of the drupe. Stamens hypogynous, united at the base. Trunk spiny or spineless. Leaves pinnate. Flowers unisexual, sessile, imbedded in the faveoles of the rachis. Seed-covering thick, albumen oily.

GENERA AND SYNONYMES.

* *Spiny.*

Desmonceus, <i>Mart.</i>	Guilielma, <i>Mart.</i>	Acrocomia, <i>Mart.</i>	„ Toxophœnix,
Aititara, <i>Marg.</i>	Martinezia, <i>R. & P.</i>	Astrocaryum <i>CWM</i>	[<i>Schott.</i>]
Bactris, <i>Jacq.</i>			

** *Unarmed.*

Attalea, <i>H. B. K.</i>	Langsdorfia,	Maximiliana, <i>Mart.</i>	? Alagoptera, <i>Nees.</i>
Elæis, <i>Jacq.</i>	[<i>Raddi.</i>]	Jubæa, <i>H. B. K.</i>	? Phytelephas, <i>R & P</i>
Alfonsia, <i>Kunth.</i>	Syagrus, <i>Mart.</i>	Molinæa, <i>Bert.</i>	Elephantusia, <i>W.</i>
Cocos, <i>L.</i>	Diplothemium <i>Mart.</i>	Orbignya, <i>Mart.</i>	? Nipa, <i>Th.</i>
			Nypa, <i>Rumph.</i>

GEOGRAPHICAL DISTRIBUTION.—The Palms are inhabitants of the tropical regions of the whole globe; a few are extra-tropical, but they do not extend in North America beyond 36° N. lat., and in Asia 34° N. lat.; in Europe, *Chamærops humilis* is found as far north as 44°; in the southern hemisphere they do not extend beyond 38°.

PROPERTIES AND USES.—It would be difficult to find a race of plants more universally useful than the noble Palms; to the inhabitants of the tropics especially, they afford food, drink, clothing, shelter, fibre, and timber; and were it not for the existence of them alone, many countries of the globe would be left without an inhabitant. Their young shoots are eaten as asparagus. The woody part of their stems supplies timber, and the interior a nutritious farinaceous food. Their leaves serve to cover dwellings, and to make partitions; split and properly prepared, they furnish material for mats, clothing, hats, umbrellas, baskets, and numerous other articles; and they supply the place of paper, writings and records being inscribed on them with a style of some hard material. The terminal shoot consists of tender, mucilaginous leaves, forming a body the size of a cabbage, which forms a nutritious food; these are eaten as a delicacy, cooked as we do artichokes, but they are never used except where the trees are abundant, for when the terminal shoot is destroyed, the tree decays. The sap of many of the palms is sweet and abundant, furnishing refreshing drinks, wine,

alcohol, and vinegar. The fruits are of infinite variety, some like berries or plums, others like nuts or cones; some are bitter, some acid, others oily; and, indeed, there is hardly any part of the Palm tree which cannot be applied to some useful purpose or another. We shall now take them individually and see what their properties and uses are.

Areceæ.—The flowers of several species of *Chamædorea*, before they burst the spathe, are collected and used in Mexico and Central America as a culinary vegetable. The berries are extremely numerous, only about the size of a pea, and of a bright red colour. The plants are of a slender growth, sometimes not above three quarters of an inch diameter in the stem, and rising to the height of twenty feet or more. They are employed in New Granada for making bridges, in the same way as the bamboo is in China and India. *Kunthia xalapensis* is a native of New Granada, another of those slender-growing palms, about an inch in diameter, and upwards of twenty feet long; the stems are used by the natives for making their blow-pipes, or *gravatánas*, through which they discharge their arrows; and the juice is regarded by them as a remedy against the bites of venomous serpents. All the species of *Leopoldina* are natives of Brazil, and are found in Rio Negro and Pará. The fruit of *L. major* is collected by the Indians in large quantities, and by burning and washing they extract a floury substance, which they use as a substitute for salt, when they cannot procure that article. Mr. Wallace says it is doubtful whether the fruit contains any true salt, for the extract is described as being more bitter than saline in its taste; yet with this substance alone to season their fish and cassava, the Indians enjoy almost perfect health. The natives call the tree *Jará-assu*. With the timber of *L. pulchra*, which they call *Jará-miri*, they form palisades round gardens and houses, and on certain saints' days little altars and green avenues are made with the leaves before the principal houses in Barra; the graceful leaves rustling in the evening breeze, fitfully reflecting the light of the wax tapers which burn before the images of the saints, with the blazing torches of the rustic procession, produce a very pleasing effect. *Euterpe edulis* is also a native of Brazil, and produces fruit, in size, shape, and colour like sloes. With these fruit the inhabitants make a favourite beverage called *Assai*, which they sell about the streets of Pará; it is made by infusing the fruit for about an hour in tepid water, which serves to render the outer pulp tender; the water is poured off, and a little cold water added, in which the fruit is bruised and kneaded with the hands, water being added from time to time, till the pulp is entirely removed from the stones; after being poured through a wicker sieve it is fit for use, and is of the consistence of cream, a purple colour, and nut-like flavour; it is eaten with mandioca, and forms an important article of food among the natives. *E. oleracea* produces a "cabbage" which is eaten as a vegetable or pickled. *Oncosperma filamentosa*, a native of the Eastern Archipelago, is called by the Malays *Nibong*, and it produces a cabbage which is more highly esteemed in Borneo than that of the cocoa-nut or the areca; its wood is used for flooring and for rafters, bound together by rattans.

The fruit of many species of *Cenocarpus*, a genus of Palms, natives of Brazil, are adapted for making a sort of wine; the fruit of *Ce. distichus*, *Ce. bacaba*, and *Ce. batava*, subjected to decoction and pressure, furnish an eatable oil, mixed along with olive oil, and used for domestic pur-

poses and in cookery. From the *Patava* (*C. batava*), a wholesome beverage is made in the countries about Rio Negro, and called *Patava-yukissé*; it is slightly aperient in its effect, from the oil it contains, but this passes off in a few days. The leaves are used as thatch, and the nerves serve the Indians for arrows to blow through long wooden tubes. The fruit of *Oreodoxa regia* are acrid, and are used in the island of Cuba to fatten hogs, and the tree is frequently employed for making avenues. The fruit of the *Areca Palm* (*Areca catechu*), termed *Betel Nut*, is an object of some importance in the East Indies. It enters into the masticatory called betel, so extensively used in India, and which is described at page 688. Every native carries with him his little apparatus, consisting chiefly of a box for the lime paste and a little case to hold the nut and the leaf, with the necessary appendage of a pair of small cutting nippers. The nuts of the fruit are mixed with other ingredients to compose a sort of liquid electuary, of which half a cupful twice a day is taken as a remedy against the constipation that follows certain dyspepsias. The fruit of the *Areca* are about the size of an egg, and are eaten; but they are very astringent, and, on analysis, were found to contain gallic acid, a great quantity of tannin, a principle analogous to that of the pod-bearers, gum, volatile oil, a red insoluble matter, a fatty matter, and some salts. A sort of catechu is obtained from the nuts by boiling them in water and evaporating the decoction; there are two varieties of it—one, black, very astringent, and mixed with paddy husks, and other impurities, is got by evaporating the first decoction, and is called *Kassu*; the other yellowish-brown, of an earthy fracture, and pure, is the result of the evaporation of a decoction of the previously used nuts, and this is called *Courry*. Ainslie states that both varieties are sold in the bazaars of Lower India, and used for the same purpose as officinal catechu. Besides being employed as a masticatory, and in the materia medica, it is also used for tanning leather and dyeing; considerable quantities of it are consumed in this country by the calico-printers. The terminal shoot of this palm forms "a cabbage," as does that of *A. humilis*.

The *Cabbage Palm*, properly so called, is *Areca oleracea*. This is a native of the West Indies, a lofty tree 170 to 200 feet high and 7 feet in circumference at the base; for twenty-five or thirty feet the bark is of an ash-grey colour, but from that to the top it is of a beautiful, deep, sea-green. The leaves, when fully grown, are twenty feet long and are composed of a single row of leaflets, some of which are three feet long and an inch and a half wide, arranged on each side of the great midrib; when the herbaceous parts of these leaflets is removed, the inside exhibits numerous long, fibrous filaments, which, being spun, are used for making cordage of all kinds, and fishing-nets that are considered stronger than those made of any other material of a similar nature. The footstalk of the immense leaves have great broad bases, which quite envelop the trunk, and which, being in the form of a hollow trough, are used by the negroes as cradles for their children; on the inside of the very young foot-stalks are tender pellicles, which, when dried, are said to serve for writing-paper, and the inside skin of the green leaves is said to supply the same material. The terminal bud called "the cabbage" lies among many thin, snow-white, brittle flakes, and tastes like an almond, but sweeter; this substance is boiled and eaten with meat, in the West Indies, in the same manner as turnips and cabbage, and it is

considered not only a luxurious but an extravagant dish, seeing the removal of the terminal bud involves the destruction of the tree. The flower-stalk, before the bursting of the spathe, is pickled while young and tender. The trunks serve as gutterings, the pith makes a sort of sago, and the nuts yield oil, by decoction, similar to that of Elæis. The woody portion of the trunk is very hard, but so thin that it is not adapted for timber purposes, the only use to which it is applied being for walking-sticks and ramrods. After the trees are felled, a sort of grubs are bred in the pith, which are eaten and esteemed a great delicacy in Martinique and St. Domingo; they are about two inches long, and the thickness of a finger; strung on wooden skewers and placed before the fire, as soon as heated they are strewed over with raspings of crust, salt, pepper, and nutmeg; this powder absorbs all the fat, which would otherwise escape, and, when properly roasted, they are served up with orange and citron sauce.

Iriarteia (Ceroxylon) andicola was discovered by Humboldt and Bonpland in a part of Peru bordering on the Andes, at the height of 3000 feet. It grows to the height of 160 feet, and on the annular cicatrices left by the leaves when they drop off, a resinous matter resembling wax is found, which, mixed with a portion of wax or tallow, serves to make candles that burn very well. This substance is called by the inhabitants *cera de palma*; by analysis it was found to be composed of two parts of yellow resin and one of wax, more brittle than bees-wax. It exudes also from the leaves, and is of a whitish colour, almost without smell, except when heated, and then it gives out a resinous odour; in its natural state it is tasteless, but when dissolved in alcohol it is bitter, and contains a bitter extract, which it yields to water. A sub-resin has been discovered in this substance and called *Ceroxilin*, which is in the form of white silky crystals, phosphorescent by friction, and soluble in alcohol. This palm might be grown in the south of Europe wherever *Chamærops humilis* is found. It was discovered by Humboldt in the Cordillera, at the Pass of Quindiu, not lower than 7930 feet, and not higher than 9700 feet above the level of the sea. To obtain the wax the tree must be felled, and each tree will yield twenty-five pounds. A man will cut down and scrape two trees in a day, giving fifty pounds at least. After scraping, it is merely melted and run into calabashes for the use of the villagers in the neighbourhood of the Tolema range. The trunk of this lofty and noble palm yields a durable timber, and is chiefly employed in making canoes and aqueducts; its leaves are used for thatching, and the fibre for cordage. *I. exorrhiza* is a native of the forests of Central and South America, is called *Piziuba*, and grows to the height of fifty or sixty feet. The roots are produced from that portion of the stem which is above-ground, every new root arising from a point above those that preceded it, and growing in an outward direction till it reaches the ground, where it throws out numerous fibres into the soil. As new roots are produced, the lower ones decay, so that at last a lofty tree is left, supported, as it were, on three or four legs sufficiently high to admit of a man passing under them erect. The roots are covered with small tuberculous prickles, and a portion of one is used as a grater for grating down the kernel of the cocoa-nut. The trunks of the tree are formed into a musical instrument called by the natives *Juripari*, and which resembles a monster flageolet or bassoon; the timber is used for flooring and in structures, and is also exported to the

United States for umbrella-sticks. With the stems of *I. setigera*, a small palm from ten to fifteen feet high, the native Brazilians make blow-pipes, or *gravatanas*, through which to project their poisoned arrows.

Arenga saccharifera is a native of the Moluccas, Cochin China, and the Indian Archipelago. It contains an abundant sweet sap, from which the natives obtain a chocolate-coloured sugar they call *gaula-itan*, which is much employed, because it costs less than cane sugar; by Easterns this sugar is called *Jaggery*; the juice is obtained at all times from the spadices of the male flowers, by first beating them to cause the sap to flow to the part, and then making incisions, from which the juice flows in abundance. In Sumatra this palm is called *Anou*; and as it also supplies a kind of sago, it furnishes the inhabitants with food, sugar, and drink. From the fermented juice called *neroo* (toddy), a drink called *brum* is made which is intoxicating, and has no doubt furnished the name "rum" to the West Indian liquor made from molasses, just as toddy has supplied a similar name to the sweetened mixture of whisky and water drunk in Scotland. The bark of the fruit, on the contrary, has an acrid, corrosive juice, that causes acute pains when applied to the skin, and still more excessive when put in the mouth. After the tree has become exhausted by the copious discharge of juice, it is cut down, and as much as 150 or 200 lbs. of a sort of sago is obtained from its stem. From the leaves of this tree is obtained the *Gomuto fibre*, so well known in the East. These leaves, or fronds, are from fifteen to twenty feet long, and yield from four to seven pounds of fibre each; the fibre is extremely tough and strong, like stiff bristles, or black horse-hair, and is celebrated in the countries where it is produced, both for its strength and for its imperishable nature, even when exposed to wet. It is extensively used for cordage, the native shipping of all kinds being equipped with it, and the largest European shipping in India find it of advantage to use it for cables; it is also employed for stitching together thatch, and for making brooms. On the outside of the leaves there are thick, whale-bone-like fibres, which are attached to the thinner fibres by cellular tissue, and these are used in Sumatra as styles for writing on the leaves of other palms. The midribs of the leaflets are made into pens called *pansuri*, and into the small arrows that the Indians blow from long tubes; at the base of the leaves there is a fine woolly material, called *baru*, much employed in caulking ships, stuffing cushions, and for tinder. Dr. Roxburgh says of this tree—"I cannot avoid recommending to every one who possesses lands, particularly such as are low and near the coasts of India, to extend the cultivation thereof as much as possible. The palm wine itself, and the sugar it yields, the black fibre for cables and cordage, and the pith for sago, independently of many other uses, are objects of great importance, particularly to the first maritime power in the world, which is in a great measure dependent on foreign states for hemp." Mr. Low says that, in Borneo, the hairy filaments of the footstalks are plaited by the natives into ornaments for the arms, legs, and neck, which are more pleasing in their deep black hue and neat appearance, than the beads and brass with which these people are fond of adorning themselves.

Caryota urens is a lofty tree, a native of India, and bears fruit the size of a plum, the flesh of which is so acrid that it corrodes and burns the lips, and hence the specific name. In Ceylon the tree yields a sort of liquor, sweet,

wholesome, and no stronger than water; it is taken from the tree twice or thrice a day, and an ordinary tree will yield three or four gallons. This liquor is boiled, and forms a sort of sugary syrup, called jaggery, which is supplied by several others of the family. When the tree arrives at maturity a small bud appears at the top; this bud is cut and prepared by putting salt, pepper, lemons, garlic, and leaves over it, which keep it from ripening; a slice is cut off from the end every day, and the liquor drops into a vessel set to catch it. The buds, like those of the betel and cocoa, are excellent in taste, resembling walnuts and almonds. A sort of sago is obtained from the pith, which the natives make into bread, and boil into a thick gruel, forming a great part of the food of the people. The tree is called *Evim-pannah* in Malabar, *Jeroogoo* in Zelinga, and *Kittul* in Cingalese. The trunk is a foot in diameter, and the leaves are twenty feet long by twelve feet across. The fibre, called *Kittul fibre*, is of great strength and used for cordage, brooms, brushes, baskets, and caps, and from its great strength is used for tying wild elephants. The leafstalk affords the natives an excellent fishing-rod by merely stripping off the leaflets, and is well adapted for this purpose, being light, tapering, and elastic. The woolly material found at the base of the leaves is sometimes used for caulking ships.

Calamææ.—In this tribe the genus *Calamus* seems to form the connection between the Palms and the Grasses, having the inflorescence of the former and the habit of the latter; it furnishes the Rattan Canes, of which there are several kinds, and are all distinguished by long, round, solid, unbranched, jointed stems, sometimes 400 feet long, climbing up trees, or rambling in jungles, and extremely tough and pliable.

The small *Rattan Canes*, used for various purposes, and when split for working chair bottoms, couches, baskets, mats, and such like articles, are the produce of *Calamus Royleanus* and *C. Roxburghii*, both species being formerly included by Linnæus in *C. rotang*. The former extends more to the North, and yields those Rattans collected in the Deyra Doon; while *C. Roxburghii* furnishes those obtained in the southern latitudes. Another kind of Rattan is called *Dragon Cane*, and is thicker than the last, but is light and dark coloured, with long internodes and a hard bark, less flexible than the common Rattans, but strong, springy, and much valued; a variety with soft bark is called *Manilla Dragon Cane*. The handsome walking-sticks, called *Malacca Canes*, are obtained from *C. scipionum*; they are imported from Siak, on the coast of Sumatra, and are not produced in Malacca. The *Great Rattan*, called *C. rudentium*, is so tough, it is twisted into cables, with which the vessels of Java, Sumatra, and the Eastern islands are furnished; they are extensively manufactured at Malacca. In consequence of its great strength and toughness it is often used, in a green state, for binding wild elephants, dragging sawny coaches, and serving other purposes of a very powerful rope.

Calamus draco is a native of the Moluccas and India, and is the plant that produces the resinous substance called *Dragon's Blood*. This is obtained either as an exudation on the surface of the fruit, and separated by rubbing or shaking in a bag, by incision of the stem, or by exposing the fruits to steam, and collecting the softened resin that exudes; an inferior kind is procured by boiling the fruits. The substance is in masses, of a

dark red colour, the size of an olive or walnut, and in sticks enveloped in the leaf of the talipat palm; the inferior kind is in flat circular cakes. It was formerly considered an astringent, and was used in various complaints, but it is not now employed in medicine except to colour tinctures. It is employed in the arts to give a red colour to varnishes and paints; and a solution of it in spirits of wine is used for staining marble, to which it gives a red tinge, that penetrates more or less deeply according to the heat of the marble during the time of application; by the addition of pitch, the colour may be rendered deeper. It consists of 90·7 of a red resin called *draconin*; 2·0 of fixed oil; 3·0 of benzoic acid; 1·6 of oxalate of lime; and 3·7 of phosphate of lime. A similar substance is obtained from *Pterocarpus draco*, *Draecena draco*, and *Croton sanguifluum* and *Croton draco*. *Zalacca edulis*, a native of the East Indies, produces a fruit about the size of a walnut, covered with juicy, pulpy scales, which are much esteemed by the Burmese, and the tree is cultivated for the sake of the fruit, which is pleasantly acidulous. *Raphia vinifera* is a native of Guinea, and grows to the height of fifty feet; with the timber and the wide bases of the leaves, the negroes construct their huts; from the sap, wine of a greyish colour, called *bourdon*, is obtained, which is not so sweet as the toddy of *Phoenix dactylifera*, but stronger and more spirituous, and on that account preferred by the natives. With the fruit, deprived of their scales and fermented in water, a beverage extensively used by the common people is made, but it does not keep like the wine. This tree does not furnish sago. *R. flabelliformis* furnishes the cane called *Ground Rattan*. One of the most beautiful Palms of South America is *R. tadigera*, inhabiting the banks of the Amazon. The trunk is not above six or eight feet high and a foot in diameter, but the leaves rise almost perpendicularly from it, and bend over in graceful curves fifty feet and upwards in length. The leafstalk is often twelve or fifteen feet in length and four or five inches in diameter, perfectly straight and cylindrical. When dried, says Wallace, it almost equals the quill of a bird for strength and lightness; but the Indian values it too highly to use it entire. He splits off the most glossy outer covering in perfectly straight strips, and makes baskets and window blinds. The remaining part is of a consistence between pith and wood, and is split up into laths about half an inch thick, and serves for a variety of purposes. Window shutters, boxes, bird-cages, partitions, and even entire houses are constructed of it.

From various species of *Sagus* the true *Sago* of commerce is derived. There are many varieties of sago, produced by different palms and also by *Cycas revoluta*, but the genuine commercial sago is for the most part taken from one species or another of this genus, and those which supply it in greatest quantity are *S. Rumphii*, *S. levis*, and *S. farinifera*. *Sagus Rumphii* is a small tree, comparatively speaking, not above thirty feet high. It is a native of the Indian Archipelago, particularly of Malacca, Borneo, Sumatra, Celebes, and the Moluccas. Before the tree has arrived at maturity the stem consists of a mere shell about two inches thick, filled with a great mass of spongy pith, becoming gradually absorbed, and ultimately the stem remains hollow. At the time when the pith is fully developed, and before it has begun to diminish, which is indicated by the superior leaves being covered with a sort of farina or white dust, the tree is felled, and the trunk cut into lengths six or seven feet long, which are

split to admit of the pith being more easily removed. The pith is in the state of a coarse powder, and is mixed with water in a trough having a sieve at one end; the water, loaded with farina, passes through the sieve, and is received in convenient vessels, where it is allowed to stand till the insoluble matter has subsided. The water is then strained off, and the farina which is left may be dried into a kind of meal or moulded into whatever shape may be desired. Sago, as it comes to this country, is prepared by forming the meal into a paste with water, and rubbing it into grains; it is produced in the greatest abundance in the Moluccas, but of the finest quality on the eastern coast of Sumatra. The Chinese of Malacca refine it so as to give it a fine pearly lustre, and large quantities are also prepared at Singapore. It is said that a single tree will yield from 500 to 600 pounds of sago. There are several other modes of extracting the fecula, varying somewhat in detail in different countries, but the one just explained is that pursued in the Moluccas. Sometimes the natives merely cut the pith in slices and toast it before eating it, and others preserve the fecula in stems of bamboo. Sago forms the principal food of the natives of the Moluccas. A decoction of sago fermented yields alcohol by distillation, and by ascrescence it forms vinegar. The fruit of this palm is the size of a hen's egg. The base of the leaf-stalks is covered with long, fibrous filaments, that serve to make cordage and sacking. *S. lævis* and *S. farinifera* are natives of the same islands, and equally furnish the sago of commerce.

Mauritia flexuosa is a native of Guiana, on the banks of the Orinoco, where it is called *Bache*; it supplies many uses, and is the main support of the people wherever it grows. With it the natives form their dwellings; and by means of mats made from the fibres of the fan-shaped leaves, and suspended by cords between two trees, they form hammocks, in which they sleep, elevated a few feet above the ground. From the fermented juice of the tree a beverage is obtained; and from the pith, sago. Its fruits contain a kernel, which is formed into a kind of bread, and with its fibre they make clothing.

Borasseæ.—The *Palmyra Palm* (*Borassus flabelliformis*) is one of the most important of the family to which it belongs, serving, as it does, all the purposes of the Sago Palms in the Eastern islands and the Cocoa in the countries where it is found; and it is singular that in Ceylon, for instance, where in the north of the island the Palmyra abounds, there are few Coconuts; and in the south, where the Cocoa abounds, the Palmyras are only sparingly found. It is the most common palm of India, and may be seen in almost all parts, even as far north as 30°. In many parts of the country it grows spontaneously, in others it is cultivated with great care, and it rises to the height of twenty or thirty feet, and has fan-shaped leaves about four feet long. By the Bengalese it is called *Tur* or *Tala*, and by the Tamuls *Panna-maram*. The fruit is somewhat triangular, about the size of a child's head, with a thick, fibrous, somewhat succulent rind, and contains three seeds about the size of a goose's egg. These seeds, when young, are eaten by the natives, being jelly-like and palatable. It is this tree that furnishes a great portion of the *Palm Wine* of India, called by the natives *Callu*, by the Tamuls *Noonpoo*, and by Europeans *Toddy*, which is a corruption of the common Mahomedan term *Tari*; and from the word toddy,

the appellation now used in Scotland to signify the sweetened mixture of whisky and water has arisen. Dr. Buchanan thus describes the manner of obtaining the wine: "Previous to the bursting of the membrane which covers the flowering branch called by botanists the spathe, or spadix, the workman mounts the tree by means of a strap passed round his back and a rope round his feet, and bruises the part between two flat pieces of stick; this is done for three successive mornings, and on each of the four following he cuts a thin slice from the top to prevent the spathe from bursting. On the eighth morning a clear, sweet liquor begins to flow from the wound, which is collected in a pot suspended for that purpose. A good tree will discharge daily about three quarts of juice, which, if intended for drinking, will keep three days; on the fourth it becomes sour, and what is not sold or drank is distilled into *arrack*." Palm wine, besides being drank, and fermented so as to afford the spirit called arrack, is also converted into a sort of rob, or uncrystallised sugar, called *Jaggery*. In the pots intended to receive juice that is to be boiled to jaggery, a little quicklime is put, to prevent fermentation, by absorbing any acidity that may arise, and the juice must be boiled on the same day on which it is taken from the tree. Twelve trees, on an average, daily fill a pot, which, when boiled down, gives six balls of jaggery. In some places the wine is used for drinking only, but where it is plentiful it is made into jaggery, which the poor use as a substitute for the sugar of cane. Forbes says that three quarts of the wine boiled down produce a pound of sugar. The young plants of the *Palmyra* Palm, when but a few inches high, are used as pot vegetables by both the Hindoos and the Cingalese; in some districts they are dried, and pounded into a sort of meal, and in most they are boiled and eaten with a little of the kernel of the Cocoa Nut. The leaves are used by the natives for thatching houses, for making small baskets, mats, hats, umbrellas, and large fans called vissaries; and they are universally used for writing upon with an iron style. The outer wood is very hard, black, heavy, and durable, capable of longitudinal division, and susceptible of a very high polish; it is called *Palmyra-wood*, and is employed in structures and for making bows. The fibres of the leaves are employed in the Madras Presidency for making twine and small rope; they are about two feet long, strong and wiry. Near the base of the leaves there is found a fine down used for straining liquids through, and also for stopping bleeding from wounds.

The *Double Cocoa Nut*, or *Sea Cocoa Nut*, as it has been called, is the fruit of *Lodoicea seychellarum*. These nuts may be often seen in museums and cabinets of the curious, sometimes highly polished and carved, and formed into baskets, caskets, and other ornaments. For a long time their origin was unknown; they were found floating about in the sea, and it was absurdly thought that they were the fruit of some marine tree that formed forests at the bottom of the ocean. Sir William Hooker says: "The Malay and Chinese sailors used to affirm that it was borne on a tree deep under the water, which was similar to a cocoa-nut tree, and was visible in placid bays on the coast of Sumatra, but if they sought to dive after the tree it instantly disappeared. The negro priests declared it to grow near the island of Java, with its leaves and branches rising above the water, in which a monstrous bird or griffin had its habitation, whence it used to sally forth nightly and tear to pieces elephants, tigers, rhinoceroses, with

its beak, whose flesh it carried to its nest." The tree is elegant in its growth, rising to the height of fifty or sixty feet, and sometimes even to eighty or a hundred feet, with a straight stem a foot in diameter, apparently destitute of bark, and with scarcely any difference in size to the very top, where it is crowned with a tuft of from twelve to twenty leaves; these are very large, some being found to be twenty feet long and ten or twelve feet wide, supported on a footstalk as long as the leaf itself. The fruit is often a foot to a foot and a half in length, of the shape of a melon, and weighing twenty to twenty-five pounds; it is enveloped in a green husk like the walnut, and which, before it attains maturity, the interior near the base being divided into two parts, contains a substance like a white jelly, firm, transparent, and sweet to the taste. The kernel of the nut is very hard, white, and horny, and may be rasped with a file, but is with difficulty cut with a knife; it is eatable, but of little flavour, and is esteemed astringent and useful in dysentery. The tree produces a "cabbage" that is used as the real Cabbage Palm; the trunk being split and freed of its pith, makes water-troughs, and palisades for enclosing houses and gardens. The leaves are employed to thatch houses and form partitions; a hundred leaves will construct a commodious dwelling, including even the partitions of the apartments, the doors, and windows. The down which is attached to the young leaves serves for filling mattresses and pillows. The ribs of the leaves and fibres of the footstalk form baskets and brooms, and the young foliage makes an excellent material for hats. With the nut, vessels of different forms and uses are made; when preserved whole, and perforated in one or two places, it serves to carry water, and some of them will hold six or eight pints.

The *Doum Palm* of Egypt is *Hyphæne thebaica*. It abounds in Upper Egypt, and extends even to the centre of Africa. The tree bears, twice a year, fruit somewhat elongated, of the size of an orange, but of an irregular shape, and it forms an important article of food among the poor population of Upper Egypt. They peel off the outer skin, which is red, and eat the spongy and almost dry substance covering the kernel; it has a disagreeable dryness and insipid sweetness. In Thebais, where it forms extensive forests, an infusion of the fruit of the Doum, with dates, is drank as a beverage, which is cooling, gently aperient, and well calculated not only to temper the heat of a fever, but to effect a cure. Dr. Lindley is in error when he states, in his "Vegetable Kingdom," that the gum-resin, Egyptian bdellium, is obtained from this tree; the Doum does not yield any resinous or gummy substance, and the article referred to is the product of a species of *Balsamodendron*, and not of a palm—(see page 251). The leaves and the wood serve the same purposes, in Egypt and other parts of Africa, as the Palms, of which we have already spoken, do in the countries where they grow. *Manicaria saccifera* is a native of Brazil, inhabiting the tidal swamps of the Lower Amazon, where it is called *Bussú*. The leaves, says Dr. Seeman, are the largest entire leaves of any known palm, and being so tough and durable, they furnish a thatch that will last ten or twelve years. "The spathe, too, is much valued, furnishing an excellent durable cloth. Taken off entire it forms bags—hence the specific name of this palm—in which the Indian keeps the red paint for his toilette, or the silk cotton for his arrows, or he even stretches out the larger ones to make a cap—cunningly

woven by nature without seam or join. When cut open longitudinally, and pressed flat, it is used to preserve his delicate feather ornaments and gala dresses, which are kept in a chest of plaited palm leaves, between layers of the smooth Bussu cloth."

Coryphææ.—The *Talipat Palm* of Ceylon is *Corypha umbraculifera*, called in the Madras Presidency *Codda-panna*. The tree is a hundred feet high. The fruit is of no use but to propagate the species; and the leaves are the only product worth noticing. These are of an immense size, palmate, and with the footstalk towards the centre, so that they are, in fact, ready-made umbrellas; when dried, Knox, in his "History of Ceylon," says, "they are strong and limber, and most wonderfully made for men's convenience to carry along with them, for although this leaf be enough to cover nineteen or twenty men when it is open, yet it will fold close like a lady's fan, and then it is no bigger than a man's arm." These leaves are carried over the heads of the higher classes in Ceylon when they walk abroad, as a protection from the sun, and a very light tent is made of it; for this the cane-like ribs are removed and the blades neatly sewn together. When exposed to the weather it is not so durable as the Cocoa-nut and Palmyra leaves, which are more common for thatching huts: but it is used extensively in in-door work, such as for screens, and as the inside thatch of the roof. The leaves are very much employed for writing on with an iron style, with which the characters are scratched, and then the strips of leaf are smeared with various compositions, which, remaining in the scratches, give greater distinctness. Fresh cowdung tinged with black, or oil and fine charecoal are used. The leaves are prepared for this purpose by soaking them in water or milk, and smoothing with a flat piece of wood; for ordinary purposes the leaves are used with little pressure, but for the books or oolahs, as they are termed, more care is required, and they are occasionally very much ornamented; most of the books shewn in Europe for Egyptian papyrus are of this palm. The spathes of the flowers, when cut, yield a liquor that becomes concrete in the sun, which acts as an emetic, and is used by the native women to procure abortion; when the spathes open, they burst with the report of a gun. *C. Taliera* is the *Talipat* of the Peninsula of India, and the *Tura* of Bengal. It is also an immense tree, a hundred feet high, and its leaves are highly valued in Northern India for various useful purposes—as making hats and umbrellas, covering dwellings, and writing on; and, on account of their great strength and durability, they are used for tying the rafters of houses. *C. gebanga* has its young leaves plaited into baskets and bags, affording much employment to the people of Java; these leaves are also employed for thatching and making broad-brimmed hats; it is said the root is slightly astringent, and is administered in diarrhœas. The fruits of *C. pumas* are eatable, have a sweet taste, and form an article of food for dogs and foxes in Mexico.

Livistona Jenkinsiana is the *Toka-pat* of Assam, which Col. Jenkins says is an indispensable accompaniment of every native gentleman's house; but in some parts it is rare, and the trees are then of great value. The leaves are in universal use throughout Assam, for covering the tops of doolces and the roofs of khel-boats, and also for making the peculiar hats or umbrella-hats of the Assamese. *Licuala peltata* is the *Chittah-pat* of Assam, and its leaves are extensively employed for making umbrellas,

punkahs, and hats. Scarcely a labourer of the commonest description who has not his umbrella hat, made of chittah-pat, but the leaves are coarser than those of the former. The stems of *L. acutifida* furnish the excellent walking-sticks called *Penang lawyers*. The fruit of *L. spinosa* are fleshy, oval drupes, about the size of Sweet Bay berries. In the Isle of Celebes and in Macassar the narrow leaves are used for tobacco pipes, and the middle broad ones for wrapping up fruit. *Copernicia cerifera* is a native of the northern districts of Brazil, where it is called *Ceranaiba*. The fruit is the size and shape of an olive, bitter and uneatable when green, but as they ripen they become black and sweet, about the month of February, and are eaten both raw and prepared in various ways under the name of *Tirade*. It is a slow-growing tree, sometimes forming large forests, and sometimes growing apart, and never attaining more than forty feet in height. The leaves are used for the same purposes as those of other palms generally are, and when young are given to horses and cattle; but they also yield a vegetable wax, which is formed on their surface, and is obtained by shaking them after they have been removed from the tree and become withered. This wax is melted in pots over a fire, and is used to adulterate bees-wax; it has been employed in this country in the manufacture of candles, but no process has hitherto been discovered by which to deprive it of its yellow colour. The pith produces a fecula used by the inhabitants. The leaves of *C. tectorum*, a native of New Granada and Venezuela, are used for thatching, and will last for more than twenty years; and the wood, says Humboldt, is excellent for building purposes, and so hard it is difficult to drive a nail into it.

The *American Palmetto Palm* (*Sabal palmetto*) is a native of Carolina and Florida. Its leaves are made into hats, and its wood, which is very durable, is used in structures. The roots contain tannin. The *Palmetto* of Europe is *Chamærops humilis*, a small palm, inhabiting the countries bordering on the Mediterranean, where it occupies large tracts, covering wild and uncultivated lands much in the same way as furze and fern do in this country. It is of small size, varying from two to ten feet in height; the stem terminated by a crown of fan-shaped leaves. The leaves are used for thatching, brooms, hats, and for seating chairs. They abound in excellent fibre, which, mixed with camel's hair, the Arabs make into tent-covers; this fibre also makes excellent cordage, and even sailcloth in Spain, and in France it is used in making carpets, under the name of *African hair*. As a material for paper it is highly valuable, and might become in this respect an important commercial commodity; for this purpose it is used by the French in Algeria, who make paper and pasteboard of it. The fruit and young shoots are eaten by the Arabs, as well as by the inhabitants of Sicily and Southern Italy, where they ripen. *C. Ritchieana*, called *Maizzurrye* in Pushtoo, and *Pfees* in Seinde, supplies excellent fibre, which is much used in Affghanistan and Seinde for cordage and twine, and the leaves are employed for making sandals, baskets, mats, fans, and bags. *C. excelsa* is a native of China and Japan, and according to Mr. Fortune, its fibre is employed by the Chinese for bed bottoms, ropes, and cables; of the leaves hats are made, and garments that are worn in wet weather. *Raphis flabelliformis*, a native of China, is the palm that furnishes the walking-cane called *Ground Rattan*. These walking-sticks are known by their straight head,

and the pale colour of the cane; some are distinguished by a soft and some by a hard bark. *Thrinax argentea* is a native of the West Indies, and it is from its leaves that the material called *chip* is obtained, of which summer hats are made in this country; the leaves are also used for baskets and wicker-work. *T. parviflora* is very abundant in Jamaica, and Brown says the trunk, which seldom exceeds four or five inches in diameter, is much used for piles, in wharves and other buildings made in the sea, for it stands the water well, and is never touched by the worms. The footstalks of the leaves, split and pared, serve to make baskets, bowstrings, ropes, &c., where strength and toughness are required; the leaves are used for thatching.

The *Date Palm* (*Phoenix dactylifera*) grows spontaneously throughout the whole of the East, and the greater part of Northern Africa, and is cultivated in Spain, Portugal, Italy, and Sicily. The tree is dioecious, that is, the male and female flowers are in different individuals: and thus in Africa, where the female is cultivated, the natives gather male flowers from wild dates in the desert, and shake them over the flowers of the females when they are at maturity, the pollen so distributed fertilising the female flowers, and rendering them fruitful. In times of war one of the modes the Arabs have of punishing their adversaries is to destroy all the male date trees, and the females being rendered barren, a famine ensues. The Date tree is from forty to eighty feet high, and comes into bearing when ten years old, although some of them produce fruit in their sixth year, and it continues productive till it is a hundred, or, as some say, two hundred years old. Each female tree produces six, eight, or even as many sometimes as eighteen or twenty spadices or bunches of flowers, and each of these yield about thirty dates. There are many varieties of it, varying in size, form, colour, and quality, but they all ripen at the same time, which in Africa and the East is about the end of August; but not in Spain and the northern limits of its cultivation, till about Christmas. Those grown in the neighbourhood of Rosetta in Egypt are most delicious, and large quantities are sent from thence to supply the markets of Cairo. The whole cluster of fruit is cut before it is quite ripe, when it is thrust into baskets made for the purpose, and having no other opening than a hole through which the branching extremity of the plant projects; in this situation the dates successively ripen, but generally they are either dried in the sun or in ovens. The fruit forms an important article of food to the inhabitants of Northern Africa, and a considerable object of commerce. "As a source of landed revenue," says Dr. Bowring, "it is highly lucrative. One proprietor told me that he had planted 5,000 trees, which after eight years had produced yearly fruit of the average value of from forty to eighty piastres (from eight to sixteen shillings) per tree. Revenue is collected on about two millions of Date trees." A hundred full-grown trees yield about forty hundredweight of dates. The fruits are wholesome and very agreeable to eat. They are imported to this country, but not in any very great quantity; those called *Tafilat Dates* are the best. In Africa, by pounding and kneading the fruit, thick and solid black cakes are made, for the use of the caravans on their journeys through the desert. These cakes are so hard they must be cut with a hatchet; pieces of them steeped in water afford a cooling and at the same time a nutritious beverage. The stones are soaked in water, and when they have

become soft, are given to cattle in those districts where they have no grass; and it is said that, after being burned, the Chinese use them in the preparation of Indian ink. When used alone, and as an everyday food, dates are considered heating and as causing thirst, and hence they are made into a paste and mixed with barley. As we receive them in this country they are a wholesome dessert, stomachic, emollient, easy of digestion, and pectoral. With the leaves, hats, mats, and baskets are made; and their footstalks yield a fibre that supplies cordage, ropes, and sails for boats. The long footstalks were employed by the Mamelukes in their military exercises as javelins, which they threw at each other from their horses when at full speed, and in the present day they serve as fuel for the inhabitants. In Italy the tree is extensively cultivated, even where the fruit does not ripen, for the sake of the leaves, which are much used by Roman Catholics in their ceremonies on Palm Sunday, and also by the Jews at the feast of the Passover. Several vessels leave Bordighiera with this singular freight, which they convey to many distant parts for these purposes. It is generally supposed that it was with the leaves of this palm that the multitude strewed the way on our Saviour's entry into Jerusalem. The wood of the trunk is very hard and durable, and is employed in building; the huts of the common people are all constructed of this material, and thatched with the leaves. The tree yields a large quantity of palm wine. *P. sylvestris*, or *Wild Date*, is universal throughout India, and is supposed to be the normal form of the cultivated species; it is called *Khujjoor* in some parts of India, *Hinda* in the Carnatic, *Linda* by the Mohamedans, and *Caden* by the Telingas; it does not produce eatable fruit. The tree is chiefly valuable on account of the great quantity of palm wine it produces, and from which, in Bengal, a considerable quantity of sugar is obtained. "Each tree, on an average," says Roxburgh, "yields 180 pints of juice, of which every twelve pints are boiled down to one of goor or jaggery, and four of goor yield one of good powder sugar; so that the average produce of each tree is about seven or eight pounds of sugar annually." The leaves furnish mats and bags in Bengal. *P. farinifera*, also a native of India, is the *Chitta-eita* of the Telingas, and occupies the sandy lands on the coast and the hills, from the Ganges to Cape Comorin. The trunk is not above two feet high, and it abounds in a farinaceous substance which the natives use in times of scarcity, but it is much inferior to and less nutritious than common sago.

Cocoeæ.—*Guiljelma speciosa* is to the Amazon district of South America what the Cocoa-nut is to the East Indies, supplying the inhabitants with food and necessaries. It is called in Venezuela *Piritu*, in Guiana *Paripou*, and in the Amazon district *Pupúnba*. The tree rises with a slender, cylindrical trunk, sixty feet high, thickly set with long spines arranged in rings, and produces fruit about the size of an apricot, of a triangular, oval shape, and a fine reddish-yellow colour. These fruits are eaten either boiled or roasted, when they resemble chesnuts, but they have a peculiar oily flavour; they are also ground up into a kind of flour, and made into cakes, which are roasted like cassava bread; or the meal is fermented in water, and forms a sub-acid, creamy liquid. They are also eaten by parrots, macaws, and other birds, and tame monkeys eat them greedily, but the wild ones cannot climb the spiny stems to obtain them. The wood, which, when old, is black, is so extremely hard as to turn the edge of an ordinary axe. With

the sharp, needle-like spines the Indians puncture their skin to produce the tattooed marks with which they delight to adorn themselves; and the bluish stain is produced by rubbing soot, obtained from burning pitch, into the wounds. The *Great Macaw* tree of the West Indies (*Acrocomia sclerocarpa*) is from twenty to thirty feet high; with leaves measuring from ten to fifteen feet in length. It is a native of Jamaica, 'Trinidad, and the adjacent islands and continent. In Guiana it is called *Macoya*, and in Brazil *Macahuba*. The fruit yields an oil which is sometimes sold in the shops as palm oil; it is of a yellow colour, of the consistence of butter, sweetish to the taste, and with the odour of violets; in this country it is extensively employed in the manufacture of toilet soaps, but by the natives, as an emollient in painful affections of the joints. The oil is obtained by first slightly roasting the fruit, and then reducing it to a paste; the paste being gently heated, and mixed with three-tenths of its weight of boiling water, is put into a bag and pressed between two heated iron-plates, and yields about seven or eight-tenths of oil. The nuts contained in the fruit are capable of a very high polish, and are frequently carved by the negroes into fanciful shapes. The fruit of *A. lasiospatha*, though oily and bitter, is much esteemed by the natives. The *Tucum* of Brazil, or *Astrocaryum vulgare*, is so valuable a tree to the natives of those regions where it grows, that they cultivate it near their dwellings. It supplies them with fibre, which is converted into cordage, bowstrings, nets, hats, and fans. In Rio Negro and the Upper Amazon, the Brazilians make beautiful hammocks of this fibre, which is knitted by the hand into a compact web. The *Tucuma*, or *A. tucuma*, also yields fibre similarly used, and it produces a fleshy fruit which supplies the Indians with food; with the stony seeds are turned rings, knitting pins, and other articles for which bones are employed. The fruit of the *Murumurú* (*A. murumuru*) is also very agreeable, and has a pleasant fragrance, resembling musk. Cattle eat the fruit with great greediness, and the hard, stony seeds, passing through them undigested, thickly strew the pastures of the districts of the Upper Amazon. Pigs are very fond of these seeds, and in times of scarcity are fed upon those that have passed through the stomachs of the cows. These seeds are so hard that they require a heavy hammer to break them, yet the powerful jaws of the swine grind up the hard nut, on which the teeth of few other animals could make any impression.

Attalea junifera furnishes that fibre, resembling whalebone, which is now so much used in this country for making brushes and brooms. The tree is called by the Brazilians *Picagaba*, and by the Venezuelians *Chiquichiqui*; and it is found in humid spots on the banks of rivers, widely diffused throughout the eastern side of South America. It attains the height of twenty or thirty feet; the leaves are used for thatching, and at the base of their footstalks their fibre comes off in a long, coarse fringe, and is what is called in commerce *Piassaba fibre*, *Monkey Grass*, or *Para Grass*. The fibre is an important article of commerce in the countries where it is produced, where it is employed to form cables for canoes, and cordage; but it is too thick and coarse to be adapted for any other purpose in this country than that to which it is now applied. The fruit produces the nuts known as *Coquilla Nuts*, used in turnery-work, for knobs to walking-sticks and umbrellas, and handles to bell-pulls. They are very hard, susceptible of a

high polish, and beautifully mottled with dark and light brown. The fruit of *A. cohune*, produces a kernel yielding a great quantity of valuable oil, called *Cohune Oil*, which is said to be of superior quality and to burn twice as long as the best cocoa-nut oil. The tree grows abundantly in Honduras and throughout the Isthmus of Panama. It attains the extreme height of forty feet, and its leaves are thirty feet long, while each leaflet measures three feet. The trunk yields palm wine, and the young leaflets are used for wrapping up cakes of Indian corn previous to boiling them in water. With the smoke resulting from the burnt fruit of *A. excelsa*, called *Urucuri* by the Brazilians, they blacken newly-made india rubber.

The tree producing the *Palm Oil* of Africa is *Elæis guineensis*. It is found throughout the whole of the east coast of central Africa, whence it has been introduced to the West Indies and South America, where it is cultivated for its oil. The tree attains the height of thirty feet. The leaves are fifteen feet long, and their footstalks, for four feet below the leaflets, are armed with hooked spines. The flowers have a strong and peculiar smell, like aniseeds mixed with chervil leaves. The fruit forms an immense head, consisting of a great number of bright, orange-coloured drupes, having an oily pulp and a stone in the centre, and it is from these drupes that the oil is obtained. The fruit is first bruised in wooden mortars to a paste, and this paste is then boiled in water; a reddish or orange-coloured oil rises to the surface, and is removed after the whole has been allowed to cool. When fresh, it has an agreeable odour of violets, and an oily consistence; but as it is removed into cooler regions, it acquires the solidity of butter. This oil is called *ghea* (butter) by the natives, and is universally employed by them as butter is in Europe, and with it they daily anoint their bodies. The quantity of Palm Oil now imported to this country is enormous. It is employed in the manufacture of candles, toilet soaps, and common hard soaps; and very extensively in antifrictions for the wheels of railway carriages. Palm Oil contains 31 of stearin, and 69 of olein. Besides this oil, which is also called *Palm Butter*, there is another oil obtained from the nuts by expression; and by boiling these nuts the natives make an excellent palm soup. The tree yields from its trunk an abundance of palm wine.

The *Cocoa-nut Palm* (*Cocos nucifera*) is one of the richest of Nature's gifts to man, for there is no part of the plant that is not adapted to human necessities; without it the islands of the Pacific Ocean would be uninhabitable, and the uncivilised natives of the tropics would be left to perish of hunger and thirst, without clothing and without shelter. The tree delights in regions bordering the sea-shore, where it attains the height of sixty to a hundred feet, and even more; but it diminishes in size as it recedes from the sea, or where it grows at the extremes of the tropics. When the trees cease to bear, they are cut down, and the wood, which is valuable, is used in carpentry, rafters, fencing, bridge-building, and for furniture. In this country it is called *Porcupine Wood*. Before the trees have become aged, the trunks contain in their interior a sweet, eatable pith, which has an agreeable taste; and when the growth is completed, a mass of hard fibre is found on the inside of the hard wood, which can be removed when the trunk is split in two, and which is adapted for making cordage that is more durable under water, though not so strong as hemp. From the trunk a

sort of gum, called in Tahiti *Pia-Pia*, is extracted, which, though it possesses no fragrance, is used by the women to spread over their hair. The leaves of the Cocoa-nut are from fifteen to eighteen feet long, and composed of leaflets a foot in length. With them baskets, mats, hats, parasols, and fans, are made; and they serve to cover huts and bungalows. Each leaf is enclosed, when young, in a kind of network of fibre, which is at first delicate, white, and transparent, but becomes tough, strong, and brown when old. This is stripped off and worked into garments, or used as a strainer, through which the palm wine is passed to free it of impurities. The old dried leaves are used as torches in Ceylon, and in the Friendly Islands combs are made of the midrib of the leaflets. In Ceylon the washerwomen burn the foliage for the sake of the alkali. The green leaves form the choicest food of the elephant in its tame state. In the Laccadive islands mats are made of the leaves cut out of the heart of the tree just before their unfolding, though this involves the loss of the bunch of fruit, which comes out with each leaf; but these mats are of fine quality, and much esteemed when exported. The terminal bud, or "cabbage," is tender and very delicate, eaten either raw or cooked as a vegetable, or in hashes or stews.

The fruit is a very important product of this tree. The small, green, undeveloped fruit are very astringent, and grated down, are employed in dysentery, and they enter into the composition of an ointment against tumours and swellings. When the fruit acquires its full size it is filled with a white liquid generally called the "milk," but which is in reality the albumen in a liquid state. This is mild, sweet, and slightly acidulous, a delicious refreshing drink in tropical climates, and is drunk in great quantities without inconvenience. In the West Indies, ladies wash their faces with it, believing it to restore the bloom of youth. When the fruit has attained maturity this "milk" is absorbed, or rather becomes concrete, forming what is called the kernel, from the circumference to the centre; and the youngest part of this deposit is of the consistence of cream, which is eaten with sugar; and in the Polynesian islands is made into various sorts of dishes. In its liquid state, this milk has adhesive properties, and is used by plasterers in Ceylon to mix with their white-wash. There is always a little of the liquid left in the centre of the kernel, but sometimes, though very rarely, there is a concrete, ovoid, stony substance, a sort of vegetable bezoar, of a bluish porcelain-white colour, to which the natives ascribe great medicinal properties; they are called in India *Calappa*, and are sold to the Chinese, who regard them as amulets, believing they will preserve them from a multitude of diseases. When ripe, the kernel is white, compact, and firm, and is used as food in the countries where the tree grows, prepared in a variety of ways. It is used in Ceylon in the preparation of the well-known dish called curry; the nut is rasped or scraped, and being washed in water, a kind of milky fluid is formed, and with this the cookery is performed. It is frequently eaten with rice, and in this country it is formed into excellent tarts after being reduced to a pulp. From the kernel a valuable oil is obtained, which is used in making candles, coarse kinds of soap, and for burning in lamps. The natives of the countries where it is produced anoint their persons with them daily after bathing. "In the islands of Polynesia," says Dr. Seeman, "it is scented with sandal-

wood, giving a delightful fragrance to the flowing tresses and elegant person of the dark beauties of those fascinating islands." The oil is obtained by boiling the kernel, pounding it in a mortar, and then pressing it. The liquor expressed is then boiled, and when the oil floats on the top, it is skimmed off, and then boiled; with the remains of the kernel pigs and poultry are fed. The shells of the cocoa-nut are sometimes converted into ornaments such as vases, caskets, cups, and goblets, elaborately carved; they also supply spoons, ladles, and skimmers. The fibre of the great thick husk which envelopes the nut is now well known as furnishing cocoa-nut fibre of which mats, brushes, ropes, and cables are made; in commerce it is called *Coir*. From the tree a great deal of the palm wine, or toddy, is derived in India, and from this jaggery and arrack are obtained; but, as we have already referred to these subjects when treating of the other palms of India, it is unnecessary to repeat it here.

Jubæa spectabilis is a native of Chili, where it is called *Coquito*. It rises with a naked stem to the height of forty or fifty feet, surmounted with a head of wide-spreading leaves. From the trunk of this palm a syrup is extracted, called *miel de palma*, which is much esteemed in Chili as an article of domestic consumption. This is obtained by cutting down the tree and lopping off the crown of leaves, when the sap immediately begins to flow, which it will continue to do for several months, by cutting a fresh slice every morning. A good tree will yield ninety gallons of sap, and this, when boiled down to the consistence of treacle, forms the article so much used in the domestic economy of the Chilians.

ORDER CCXXV.—HYDROCHARIDACEÆ—FROG-BITS.

THIS family differs from the following in having unisexual flowers and exalbuminous seeds. They are aquatic plants. The flowers are spathaceous, generally unisexual, rarely hermaphrodite. Perianth with six divisions, the three inner petal-like. Ovary inferior, one-celled, or spuriously three, six, eight, or nine-celled; stigmas three to nine; ovules numerous, attached to marginal ovule-bearers. Fruit dry or fleshy, unopening. Seeds with albumen. Embryo straight.

TRIBE 1. *Anacharideæ*.—Ovary one-celled. Stigmas three.

GENERA AND SYNONYMES.

Udora, Nutt.	Anacharis, Rich.	Epigynanthus, Bl.	Neehamandra, L.
Elodea, L. C. R.	Hydrilla, Rich.	Diplosiphon, Denc.	Blyxa, Thouars
Philotria, Raf.	Lagarosiphon,	Vallisneria, Mich.	Saivala, Wall.
Apalanthe, Planch.	[Harv.]	Physkium, Lour.	

TRIBE 2. *Stratioteæ*.—Ovary six, eight, or nine-celled. Stigmas six

GENERA AND SYNONYMS.

Stratiotes, <i>L.</i>	Damasonium,	Limnobium, <i>L. C. R.</i>	Jalambicea, <i>L. & L.</i>
Aloides, <i>Boerh.</i>	[<i>Schröb.</i>	Hydromystria,	Hydrocharis, <i>L.</i>
Enhalus, <i>L. C. R.</i>	Hymenotheca <i>Sal</i>	[<i>F. G. W. M.</i>	Stratiotes, <i>Dill.</i>
Ottelia, <i>Pers.</i>	Bootia, <i>Wall.</i>		

These are natives of Europe, and the extratropical parts of North America and Australia. The plants are all mucilaginous, and moderately astringent, but they do not possess any active virtues. *Ottelia* and *Bootia* are used in India as potherbs. The tuberous roots and fruit of *Enhalus* are eatable, and the leaves yield a textile fibre. The *Hydrillas* are used in India for refining sugars. *Vallisneria* is remarkable for the mode of its impregnation. The female flowers are borne on long, spiral footstalks, which rise and float on the surface, and there expand. The male flowers are produced on a separate and often a distinct plant, and on very short footstalks; but when these are nearly ready to expand they are detached from the plant, and, ascending to the surface, float about among the female flowers, and then impregnation takes place. As soon as this has happened, the females again shrink to the bottom to perfect the seed.



ORDER CCXXVI.—BROMELIACEÆ—PINE-APPLES.

GENERALLY stemless perennials, sometimes shrubby, and many of them parasitical. *Leaves* alternate, generally gathered together at the base of their stem; long, straight, thick, channelled, often toothed and spiny on their edges. Many of the species are covered with a sort of scurf. *Flowers* hermaphrodite, regular, or somewhat irregular; arranged in scaly spikes, in panicles or in heads, when they sometime appear as if they were all united together. *Perianth* with six-divisions, the outer three calyx-like, and adherent to the ovary; the inner petal-like and coloured. *Stamens* six inserted in the tube of the perianth. *Ovary* inferior, three-celled, ovules sometimes numerous, and attached to ovule-bearers, unite with the central angles of the cells, horizontal or ascending; sometimes definite, erect, or pendulous, from the base or summit of the cells, and always anatropal. Style terminated by a three-lobed stigma. *Fruit* generally succulent, sometimes capsular, crowned by the lobes of the perianth; as in the pine-apple all the fruits are sometimes collected together into a head, forming, as it were, single fruit. *Seeds* numerous, rarely few with a leathery skin, or tapering into slender thread. *Embryo* straight or curved in the base of mealy albumen; the radicle next the hilum, superior or inferior.

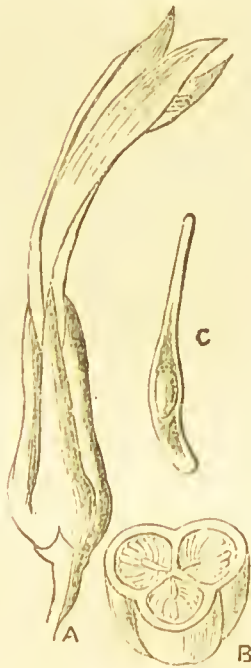


Fig. 219. A, Flower of *Pitcairnia bracteata*; B, section of the ovary; C, seed.

GENERA AND SYNONYMES.

<i>Ananassa</i> , Lindl.	<i>Æchmea</i> , R. & P.	<i>Aræococcus</i> Brongn.	<i>Hepetis</i> , Swartz.
Ananas, T.	Oechmea, Juss.	Cryptanthus, Kl.	Spirastigma Herit.
<i>Bromelia</i> , L.	Billbergia, Th.	Procchinia, Schlt. f.	Vriesia, Lindl.
Karatas, Pl.	Hohenbergia Schlt. f.	Pitcairnia, Herit.	Neumannia Brongn.
Ananas, Gärt.	Acanthostachys, Kl.		

GEOGRAPHICAL DISTRIBUTION.—They are all natives of the tropics of America, Africa, and India.

PROPERTIES AND USES.—The most important plant of the family is the well-known *Pine Apple* (*Ananassa sativa*), a native of South America, where it is called *Nana*, or *Nanon*, but now cultivated in the West Indies, Africa, and India. The fruit, called the pine-apple, is not in reality one fruit, but a collection of many, what are called the pips being the true fruit, so that the pine apple is a head formed of many fruits closely unite

together. Before maturity the fruit of the pine-apple is almost caustic, and its use would then be attended with danger; its juice is employed in the West Indies against intestinal worms, and to promote the secretion of urine. The leaves yield an excellent fibre, which is separated by the natives of India, and which has been proved to be admirably adapted not only for the finest textile fabrics, but also for cordage and other uses where great strength is required, as has been proved by a rope manufactured of it having borne 15 cwt. more than the government standard of strength. *Bromelia pigna*, a native of Manilla, yields fine hair-like fibres, with which the celebrated pine-apple cloth of the Philippines is made, resembling the finest muslin fabrics, and sometimes known by the name of *Pina Muslin*. This is sometimes called grass cloth, but erroneously. *B. penguin* is common on the rocky hills of Jamaica and other West India islands, where it is employed in making fences to their fields, and its leaves, after being steeped in water and beaten with a mallet, yield a strong fibre, which is twisted into ropes, and manufactured by the Spaniards into cloth, of which they make hammocks. *B. sagenaria* is a native of South America, where it is called *Curratow*, or *Grawatha*; its fibre is twisted into thick rope, which is said to have remained entire when those made of hemp parted. *Billbergia variegata*, or *Caroa*, yields excellent twine for nets in Brazil.

ORDER CCXXVII.—TACCACEÆ—TACCA FAMILY.

HERBACEOUS perennials with tuberous roots, radicle curved, veined leaves, and flowers in scapes. Perianth adherent, tubular, six-parted. Stamens six, inserted in the base of the segments; filaments broad and petal-like; anthers inserted below the points of the filaments. Ovary inferior, of three carpels, one or somewhat three-celled, with three marginal ovule-bearers. Fruit a berry, unopening, one-celled or half three-celled. Seeds with fleshy albumen.

GENERA.

Tacca, *Forst.*

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Ataccia, *Presl.*

Found in salt marshes and in mountainous woods of Asia, Africa, and tropical islands of Oceania. The roots of *Tacca pinnatifida*, notwithstanding they are poisonous, yield a fecula like arrowroot. The plant is very much cultivated in Arracan for the sake of the fecula, which is sold for arrowroot. *T. oceanica*, a native of the Sandwich Islands, yields a similar product, and is there called *pya*.

ORDER CCXXVIII.—HÆMODORACEÆ—BLOOD-ROOTS.

HERBACEOUS perennials, with sword-shaped, equitant leaves, and woolly hairs or scurf on their stems and flowers. Perianth tubular, six-

parted. Stamens three or six, opposite the segments; anthers turned inwards. Ovary inferior, three-celled, sometimes one-celled; ovules axile placentæ; style and stigma simple. Fruit capsular and valvula covered with the withered perianth. Seeds definite or indefinite. Embryo in cartilaginous albumen, with the radicle remote from the hilum.

GENERA AND SYNONYMES.

<i>Hæmodorum</i> , Sm.	<i>Argolasia</i> , Juss.	<i>Schwægrichenia</i> ,	<i>Barbaenia</i> , Vanda
<i>Phleboearya</i> , R.Br.	<i>Augea</i> , Retz.	[<i>Sp.</i>	<i>Visnia</i> , St.
<i>Dilatris</i> , Berg.	<i>Anigosanthus</i> , Lab.	<i>Androstemma</i> , Endl.	<i>Vellozia</i> , Mart.
<i>Lachnanthes</i> , Elliot	<i>Anigozia</i> , Sal.	<i>Conostylis</i> , R. Br.	<i>Campderia</i> , A. Rich.
<i>Heritiera</i> , Gmel.	<i>Anægosanthus</i> ,	<i>Blancoa</i> , Lindl.	<i>Radia</i> , A. Rich.
<i>Gyrothea</i> , Sal.	[<i>Rehb.</i>	<i>Aletris</i> , L.	<i>Xerophyta</i> , Con.
<i>Lanaria</i> , Th.		<i>Tribonanthes</i> , Endl.	

These are natives of North America, the Cape of Good Hope, and Australia. They contain colouring properties. *Lachnanthes tinctoria* is used in North America as madder. The roots of *Anigosanthus floridus*, *Hæmodorum paniculatum*, and *spicatum*, when roasted, are eaten by the natives of the Swan River colony. *Aletris farinosa* is a native of the United States, and called *Star-grass*. Its root is intensely bitter, and is an excellent tonic when taken in moderation, but in very large doses it is said to be cathartic and emetic, with a narcotic effect. It is said to be beneficial in colic, dropsy and chronic rheumatism.

ORDER CCXXIX.—HYPOXIDACEÆ—HYPOXIS FAMILY.

HERBS with tuberous or fibrous roots; linear, dry, often hairy leaves and numerous flowers in seapes. Perianth petal-like, six-parted. Stamens six, inserted at the base of the segments. Ovary inferior, three-celled; ovules numerous, with an axile placentæ. Style terminal, simple. Fruit unopening, dry, or berried, three-celled, or one-celled by abortion. Seeds beaked, with an embryo in the axis of fleshy albumen, and the radicle superior, remote from the hilum.

GENERA AND SYNONYMES.

<i>Curculigo</i> , Gärt.	<i>Forbesia</i> , Eckl.	„ <i>Niobæa</i> , W.	<i>Schnitzleinia</i> , St.
<i>Molineria</i> , Colla.	<i>Hypoxis</i> , L.	<i>Cælanthus</i> , W.	<i>Pauridia</i> , Harv.

These are nowhere abundant; they are met with in southern Africa, and in Australia south of the tropics, in the tropics of America, and the warmer parts of North America. *Curculigo orchiioides* has a slightly bitter root, used in India as a tonic in the form of an electuary. The root of *C. stans* is eaten as food in New Caledonia. Those of *Hypoxis erecta* are used by the North American Indians for healing ulcers and against intermittents.

ORDER CCXXX.—AMARYLLIDACEÆ—AMARYLLIS FAMILY.

HERBS with perennial, bulbous, scape-bearing roots, very rarely with fibrous roots and a woody stem. *Leaves* of the former all radical, of the latter alternate; in all sword-shaped, sheathing at the base, parallel veined. *Flowers* hermaphrodite, regular or irregular, solitary or in umbels, enclosed before opening in a spathaceous bract. *Perianth* with six divisions, adherent, corolla-like. *Stamens* six, free, or united at the base, epigynous, or inserted in the tube or throat of the perianth and opposite its lobes, sometimes an additional series of barren stamens is present, forming a cup, which surrounds the tube of the perianth; *anthers* turned inwards, two-celled. *Ovary* inferior, three-celled, each containing a great number of anatropal ovules attached to axile ovule-bearers. *Style* simple; *stigma* three-lobed. *Fruit* a three-valved, three-celled capsule, the valves bearing the partitions on their inner surface, or a one to three-seeded berry. *Seeds* with fleshy or horny albumen, and a nearly straight embryo with its radicle turned towards the hilum.



Fig. 220. *Narcissus tazetta*.
A, Section of the fruit.

TRIBE 1. *Amaryllææ*.—Flowers without a coronet of sterile stamens. Root bulbous, throwing up a scape.

GENERA AND SYNONYMES.

<i>Galanthus</i> , L.	<i>Sternbergia</i> , W. & K.	<i>Spreckelia</i> , Heist.	<i>Buphane</i> , Herb.
? <i>Erangelia</i> , Ren.	<i>Oporanthus</i> , Herb.	<i>Hippeastrum</i> , Herb.	<i>Boophane</i> , Herb.
<i>Leucojum</i> , L.	<i>Haylockia</i> , Herb.	<i>Amaryllis</i> , Sw.	<i>Ammocharis</i> , Herb.
<i>Nivaria</i> , Mön.	<i>Cooperia</i> , Herb.	<i>Coburghia</i> , Herb.	<i>Griffinia</i> , Ker.
<i>Acis</i> , Sal.	<i>Sceptranthus</i> , [Grah.]	<i>Leopoldia</i> , Herb.	<i>Crinum</i> , L.
<i>Erinosma</i> , Herb.	<i>Amaryllis</i> , L.	<i>Vallota</i> , Herb.	<i>Hæmanthus</i> , L.
<i>Lapidra</i> , Lag.	<i>Lilio-Narcissus</i> , T.	<i>Lycoris</i> , Herb.	<i>Tristegia</i> , Rehb.
<i>Carpolyza</i> , Sal.	<i>Belladonna</i> , Sw.	<i>Strumaria</i> , Jacq.	<i>Polystegia</i> , Rehb.
<i>Hessea</i> , Berg.	<i>Callirotæ</i> , Link.	<i>Hessea</i> , Herb.	<i>Cyrtanthus</i> , Ait.
<i>Gethyllis</i> , L.	<i>Zephyranthes</i> , Herb.	<i>Nerine</i> , Herb.	<i>Timmia</i> , Gmel.
<i>Papiria</i> , Th.	<i>Argyropsis</i> , Herb.	<i>Galathea</i> , Herb.	<i>Monella</i> , Herb.
<i>Ixiolirion</i> , Fisch.	<i>Pyrolirion</i> , Herb.	<i>Brunsvigia</i> , Heist.	<i>Gastronema</i> , Herb.
<i>Bravoa</i> , Llav.	<i>Habranthus</i> , Herb.	<i>Imhofia</i> , Herb.	<i>Coleophyllum</i> , Kl
<i>Cætocapnia</i> , L & O			

TRIBE 2. *Narcissææ*.—Sterile stamens, free, or united into a coronet in the throat of the perianth. Root bulbous, throwing up a scape.

GENERA AND SYNONYMES.

<i>Phycella</i> , <i>Lindl.</i>	<i>Chlidanthus</i> , <i>Herb.</i>	<i>Liriope</i> , <i>Herb.</i>	<i>Narcissus</i> , <i>L.</i>
<i>Placea</i> , <i>Miers.</i>	<i>Clinanthus</i> , <i>Herb.</i>	<i>Liriopsis</i> , <i>Rehb.</i>	<i>Ajax</i> , <i>Haw.</i>
<i>Eucrosia</i> , <i>Ker.</i>	<i>Urecolina</i> , <i>Rehb.</i>	<i>Pancratium</i> , <i>L.</i>	<i>Diomedes</i> , <i>Haw.</i>
<i>Carpodetes</i> , <i>Herb.</i>	<i>Urceolaria</i> , <i>Herb.</i>	<i>Hymenocallis</i> , <i>Sal.</i>	<i>Queltia</i> , <i>Haw.</i>
<i>Liperiza</i> , <i>Herb.</i>	<i>Collania</i> , <i>Sehlitz.</i>	<i>Schizostephanium</i>	<i>Schizanthus</i> , <i>Haw.</i>
<i>Calliphruria</i> , <i>Herb.</i>	<i>Coburghia</i> , <i>Sweet.</i>	[<i>Reiehb.</i>	<i>Ganymedes</i> , <i>Haw.</i>
<i>Eurycles</i> , <i>Sal.</i>	<i>Phædranassa</i> , <i>Herb.</i>	<i>Halmiura</i> , <i>Sal.</i>	<i>Philogync</i> , <i>Haw.</i>
<i>Proiphys</i> , <i>Herb.</i>	<i>Stenomesson</i> , <i>Herb.</i>	<i>Tiaranthus</i> , <i>Herb.</i>	<i>Hermione</i> , <i>Haw.</i>
<i>Calostemma</i> , <i>R. Br.</i>	<i>Chrysiphiale</i> , <i>Ker</i>	<i>Choretis</i> , <i>Herb.</i>	<i>Chloraster</i> , <i>Haw.</i>
<i>Vagaria</i> , <i>Herb.</i>	<i>Sphærotele</i> , <i>Pri.</i>	<i>Ismene</i> , <i>Herb.</i>	<i>Corbularia</i> , <i>Haw.</i>
<i>Tapcinanthus</i> , <i>Herb.</i>	<i>Elisena</i> , <i>Herb.</i>	<i>Callithaume</i> , <i>Herb.</i>	

TRIBE 3. *Alstræmeriææ*.—Outer divisions of the perianth different in form from the inner. Roots fibrous.

GENERA.

<i>Chæradodia</i> , <i>Herb.</i>	<i>Collania</i> , <i>Herb.</i>	<i>Bomarca</i> , <i>Mirb.</i>
<i>Alstræmeria</i> , <i>L.</i>	<i>Sphærinæ</i> , <i>Herb.</i>	

TRIBE 4. *Agavææ*.—Divisions of the perianth all alike in form. Roots fibrous.

GENERA AND SYNONYMES.

<i>Clivia</i> , <i>Lindl.</i>	<i>Campylonema</i> , <i>Poir.</i>	<i>Littæa</i> , <i>Tagl.</i>
<i>Inatophyllum</i> , <i>Hook</i>	<i>Doryanthes</i> , <i>Correa.</i>	<i>Bonapartea</i> , <i>W.</i>
<i>Himantophyllum</i> , <i>Sp</i>	<i>Agave</i> , <i>L.</i>	<i>Fourcroya</i> , <i>Vent</i>
<i>Campynema</i> , <i>Lab.</i>		

GEOGRAPHICAL DISTRIBUTION.—These are found in the greatest number at the Cape of Good Hope and South America; several are natives of the East and West Indies; a few are met with on the west coast of Africa, and in Australia, and a considerable number of the *Narcissææ* are found in Europe.

PROPERTIES AND USES.—They possess similar virtues to the bulbous species of *Liliacææ*, being aerid and emetic. Their bulbs contain a great deal of mucilage and a gum-resinous, bitter substance. The bulbs of the lovely little *Snowdrop* (*Galanthus nivalis*) are emetic and febrifuge, and being emollient and resolutive are formed into poultices; a distilled water, used as a cosmetic, was formerly obtained from them, but it is not now known. The same virtues reside in the bulbs of *Leucojum vernum* (*Spring Snowflake*), and in those of *L. æstivum* (*Summer Snowflake*). The bulbs of *Sternbergia lutea*, a native of the south of Europe and the East, were formerly extensively used for fomenting tumours, under the name *Lilio-narcissus* roots. *Oporanthus luteus* is purgative. It is said that the juice of *Amaryllis belladonna* is poisonous in the West Indies; and Thunberg states that the bulbs of *Nerine sarniensis*, or *Guernsey Lily*, are also poisonous, as are those of *Crinum Zeylanicum*. With the juice of the bulbs of

Hæmanthus toxicarius the Hottentots poison their arrows. They take the bulbs about the time they are putting forth their leaves, and, cutting them transversely, extract a thick fluid, which is kept in the sun till it becomes of the consistence of gum. This poison is used for hunting animals intended for food. After being wounded they frequently run for some miles, and are sometimes not found till next day. When the leaves are young, cattle are very fond of them, though they cause instant death. The seeds of *Pancratium maritimum* yield oil which burns well. Forty grains of the bulb produces vomiting and purging. The bulbs of all the species of *Narcissus* are more or less purgative and emetic; but particularly those of *Common Daffodil* (*N. pseudo-narcissus*), *N. poeticus*, and *N. odoratus*. Essences and perfumed waters are made from the flowers of *Jonquil* (*N. jonquilla*). The roots of *Alstræmeria ligula* are eaten in Chili, as are those of *A. tomentosa* in Peru. *Bomarea salsilla* is diaphoretic and diuretic, and is used as a substitute for sarsaparilla.

Agave americana, or *American Aloe*, is a native of Mexico, but now common throughout the whole of the West Indies, and is called by the natives *Mell*, *Maguay*, *Pita*, *Acametl*, *Sequametl*, and various other names. The root, as well as the leaves, yield excellent fibre, called *Pita fibre*, which is separated by bruising and steeping them in water. The Mexicans make their paper of this fibre. The expressed juice of the leaves, evaporated, is said to be useful as a substitute for soap. In Mexico the fibre is converted into twine, cord, and rope; and Humboldt describes a bridge over the river Chambo, in Quito, 131 feet span, of which the main ropes, four inches in diameter, were made of the fibres of the agave. Another important product of this plant is a kind of wine, called *pulque*, made from its very sugary juice. By cutting out the inner leaves, the juice flows in great abundance for several months; and, when evaporated by heat, it yields syrup, or even sugar; and, when fermented, it forms pulque, of which the Mexicans make a great trade. *A. fœtida* also yields fibre; and in Spain an extract is taken from the leaves and used as aloes. *A. mexicana* also yields pulque, and the roots of *A. cubensis* are used as a substitute for sarsaparilla. The juice of *A. saponaria* is a powerful detergent, and is extensively used in Mexico as a substitute for soap. The juice of *A. vivipara*, mixed with lime juice and treacle, makes a good dressing for ulcers. The inspissated juice is used as a plaster in gout, and the roots are chewed for diarrhœa. The root of *A. virginica* is very bitter, and is used in tincture as an antidote to the bites of poisonous serpents.

ORDER CCXXXI.—IRIDACEÆ—FLAGS.

HERBS, with a bulbous or tuberous root-stock, rarely with fibrous roots; and very rarely under-shrubs, smooth or with simple hairs. *Leaves* alternate, sword-shaped, often distichous, and equitant, sheathing at the base. *Flowers* hermaphrodite, regular, or irregular, often very large and showy, enclosed, before opening, in a thin or scarious, membranous spathe; solitary, or variously grouped. *Perianth* coloured, tubular, with six deep divisions, arranged in two series, and often unequal. *Stamens* three, epigynous, free or united together, opposite the external divisions of the perianth; *anthers* turned outwards, two-celled, bursting longitudinally. *Ovary* inferior, three-celled, many-ovuled; *ovules* inverted; *style* simple, terminated by three simple, two-cleft stigmas, which are often petal-like. *Fruit* a three-celled capsule, opening by three valves, bearing the partitions on their inner surface. *Seeds* attached to the inner angle of the cells, and sometimes to a central column. Embryo within a horny or densely fleshy albumen, with the radicle next the hilum.

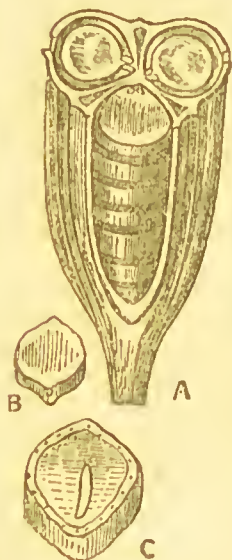


Fig. 221. A, Fruit of *Iris pseud-acorus*, opened to show the seeds; B, a seed; C, section of the same.

GENERA AND SYNONYMES.

Sisyrinchium, L.

Bermudiana, T.

Orthrosanthus, Swt.

Solenomelus, Mrs.

Cruckshanksia, Mrs.

Symphyostemon, Mrs.

Eleutherine, Herb.

Psytirisma, Herb.

Echthronema, Herb.

Eriphilema, Herb.

Calydorea, Herb.

Glumosa, Herb.

Tecophilaea, Bert.

Phyganthus, Pöpp.

Poppigia, Knzl.

Distrepta, Miers.

Libertia, Sp.

Renealmia, R.Br.

Nematostigma,

[*Distr.*

Cipura, Aubl.

Marica, Schreb.

? *Trimeriza*, Sal.

? *Hydastylis*, Sal.

? *Galathea*, Sal.

Hymenostigma,

[*Heht.*

Vicusseuxia, Roche.

? *Frenchenia* Eckl

Plantia, Herb.

Trimezia, Herb.

Moræa, L.

Homeria, Vent.

? *Dietes*, Sal.

Diplarrhena, Lab.

Iris, L.

Xiphion, T.

Hermodactylus T

Sisyrinchium, T.

Isis, Tratt.

Herbertia, Sweet.

Cypella, Herb.

Lansbergia, De. V.

Phallocalis, Herb.

Alophia, Herb.

Trifurcaria, Herb.

Hydrotænia, Lindl.

Beatonia, Herb.

Tigridia, Juss.

Polia, Tenore.

Rigidella, Lindl.

Ferraria, L.

Pardanthus, Ker.

Belemeanda, Rhd

Aristea, Sol.

Cleanthe, Sal.

? *Bobartia*, L.

Wredowia, Eckl.

Witsena, Th.

Nivena, Vent.

Genlisia, Rehb.

Sophronia, Licht.

Tapcinia, Com'n.

Patersonia, R. Br.

Genosiris, Lab.

Galaxia, Th.

Ovieda, Sp.

Lapeyrousia Pour

Peyrousia, Swt.

Meristostigma,

[*Diet.*

Anomatheca, Ker.

Anomaza, Laves.

Babiana, Ker.

Acaste, Sal.

Acidanthera, Hechst.

Gladiolus, T.

Hebea, Pers.

Lemonia, Pers.

Homoglossum Sal

Synotia, Sweet.

Streptanthera,

[*Sweet.*

Bertera, Sweet.

Antholyza, L.

Cunonia, Buttn.

Anisanthus, Swt.

Petamenes, Sal.

Watsonia, Mill.

Micranthus, Pers

Phalangium Hout

Meriana, Trev.

? *Neuberia*, Eckl.

Sparaxis, Ker.

Montbretia, DC.

Hexaglottis, Vent

Tritonia, Ker.

Waizia, Rehb.

Houttuynia <i>Houtt</i>	Eurydice, <i>Pers.</i>	Hesperantha, <i>Ker.</i>	Trichonema, <i>Ker.</i>
Freesia, <i>Eckl.</i>	Agretta, <i>Eckl.</i>	Hesperanthus <i>Sal</i>	Romulea, <i>Mar.</i>
Bellendenia, <i>Raf.</i>	Diasia, <i>DC.</i>	Geissorhiza, <i>Ker.</i>	Nemastylis, <i>Nutt.</i>
Crocoshia, <i>Pich.</i>	Aglæa, <i>Pers.</i>	? Weihea, <i>Eckl.</i>	Eustylis, <i>A. Gr.</i>
Morphixia, <i>Ker.</i>	Melasphærule <i>Ker</i>	? Spatanthus,	Gelasine, <i>Herb.</i>
Ixia, <i>L.</i>	Phalangium,	[<i>Succet.</i>	Crocus, <i>T.</i>
Hyalis, <i>Sal.</i>	[<i>Burm.</i>		

GEOGRAPHICAL DISTRIBUTION.—These are met with in greatest abundance at the Cape of Good Hope, in the United States, and Europe; a few are natives of the tropics, and some are found in South America.

PROPERTIES AND USES.—The bulbs of *Sisyrinchium bulbosum* are eaten in Chili, but the roots of *S. galaxioides* are purgative, and are used in lavements by the Brazilians. *S. tinctorium*, found on the banks of the Orinocco, contains a blue colouring-matter, which even dyes the paper in which it may be wrapped. The bulbs of *Ferraria cathartica* and *F. purgans*, natives of Brazil, contain an acrid principle which, mixed with gum and starch, communicates to them a purgative property; it is the fresh juice that is administered in the dose of two drachms. The root-stock of *Iris dichotoma* is used in Siberia as a remedy against toothache; those of *I. edulis* are roasted and eaten by the Hottentots, by whom they are called *Enkjes*; and Sparmann states that they reckon their age by the stems which this plant annually throws up from the root-stock. *Orris Root* is the root-stock of *I. florentina*, or *Florentine Iris*, a native of Italy and other parts of the South of Europe. When fresh, Orris is possessed of considerable acrimony, which it loses in drying, and has a pleasant odour, like violets, which is more fully developed when dry. It is much used in perfumery and powders, pomatums and essences. Used medicinally, it is cathartic; and in large doses, emetic; it is said to be diuretic, and to have been used successfully in dropsies, but it is not now employed except for its odoriferous properties. It is chewed by those who are afflicted with offensive breath, and is introduced into tooth-powders. Formed into small balls the size of a pea, it is, in France, put into ulcers and issues to excite suppuration and keep up the discharge; but they are dangerous from their irritating properties, sometimes causing erysipelas and inflammation. Orris contains gum; a brown extract; starch in abundance; fixed oil; a solid and crystallisable essential oil, and woody fibre. In the United States, the root-stock of *I. versicolor* is used as a purgative, but it causes nausea and prostration. The leaves of *I. foetidissima*, when bruised, give out an odour like that of roast-beef mixed with garlic, and hence it has been called *Roast-beef plant*. The root of *I. germanica* has the same properties as Orris, but more violent in its medicinal operation; powdered, it acts as a sternutatory, and is employed in tooth-powders. *I. pseud-acorus*, so common in our ponds, running streams, and moist meadows, is called *Corn Flag*; its virtues are even more active than those of the preceding. It is very astringent and may be used as a substitute for galls in making ink, and it is sometimes used for dyeing black. The seeds may be used as a substitute for coffee. *Saffron* is the stigmas of *Crocus sativus*. It was formerly considered stimulant and antispasmodic, exciting the different functions, exhilarating the spirits, and relieving pain, but it is not now of any importance except as a colouring matter for pastry, confectionery, and liqueurs.

ORDER CCXXXII.—ORCHIDACEÆ—ORCHIDS.

HERBACEOUS or shrubby plants, sometimes parasitical on other plants,



Fig. 222. *Odontoglossum citrosimum*. A, Column of *Ophrys aranifera*.

having a root composed of simple and cylindrical fibres, sometimes accompanied with one or two fleshy, ovoid, or globular tubercles, entire or digitate. *Leaves* always simple, alternate, sheathing at the base; arising directly from the stem, or from short, swollen, fleshy, bodies, called pseudo-bulbs, only found in exotic species. *Flowers* hermaphrodite, irregular, often very large and showy, assuming remarkable forms, some being like insects of different kinds, reptiles, and even the human body; they are either solitary, or in panicles or spikes. *Perianth* composed of six divisions, of which three are internal and three external; the latter are variously expanded at the base, or approximate at the superior part of the flower, where they form a sort of helmet; of the three internal, two are lateral, superior, and alike, but one is inferior, and, differing from the others in form and size, is called the

labellum or *lip*; it is sometimes furnished at its base with a long, hollow spur or horn. From the centre of the flower rises the *column*, which is composed of the style and the filaments united into a solid body, and which bears on its anterior and superior surface a glandular cavity, which is the *stigma*, and on its summit an anther with two cells, opening either by two longitudinal sutures or by a lid which forms the superior part. On the summit of the column are two small tubercles, one on each side of the anther, which are two abortive stamens, and are called *stamenodes*; but in the genus *Cypripedium* they are developed and fertile, while that in the middle is abortive. *Pollen* powdery, or collected into grains, or adhering

in wedges bound together by an elastic material, or consolidated into masses of a waxy texture and fixed number; the masses either free or adhering by a caudicle to a gland belonging to the apex of the stigma. *Ovary* inferior, one-celled, composed of six carpels, of which three opposite the internal divisions of the perianth have each two marginal ovule-bearers, and the three others have none; *style* never distinct except in *Cypripedium* and some *Neottæ*. *Fruit* a capsule, very rarely fleshy and unopening, opening in six valves, three of which carry the seed-bearers on their inner surface. *Seeds* indefinite in number, very minute, having a loose, netted skin, sometimes expanded into a circular wing, rarely hard and crustaceous. *Embryo* solid and fleshy, without albumen, radicle next the hilum.

The following arrangement is that of Professor Lindley, who has devoted much time and labour to the elucidation of this extensive and difficult family:—

TRIBE 1. *Malaxæ*.—Pollen cohering in definite waxy masses, applied directly to the stigma, without a caudicle. Anther terminal or opening by a lid. Epiphytes rarely terrestrial, with the bases of the leaves connate, or with a stem, fleshy at the base, and forming pseudo-bulbs.

SUB-TRIBE 1. *PLEUROTHALLIDÆ*.—*Column erect, continuous with the ovary, or slightly lengthened at the base.*

GENERA AND SYNONYMES.

<i>Pleurothallis</i> , <i>R. Br.</i>	<i>Lepanthes</i> , <i>Sicz.</i>	<i>Dendrochilum</i> , <i>Bl.</i>	<i>Microstylis</i> , <i>Nutt.</i>
<i>Rhynchopera</i> , <i>Kl.</i>	<i>Restrephia</i> , <i>Kunth.</i>	<i>Aclinia</i> , <i>Griff.</i>	<i>Crepidium</i> , <i>Bl.</i>
<i>Myoxanthus</i> , <i>P. & E.</i>	? <i>Cadetia</i> , <i>Gaud.</i>	<i>Osyricera</i> , <i>Bl.</i>	<i>Monorchis</i> , <i>Mntz.</i>
<i>Specklinia</i> , <i>Lndl.</i>	<i>Physosiphon</i> , <i>Lndl.</i>	<i>Chrysoglossum</i> , <i>Bl.</i>	<i>Achroanthes</i> , <i>Raf.</i>
<i>Centranthera</i> , <i>[Scheidw.]</i>	<i>Masdevallia</i> , <i>Pl. Per</i>	<i>Obcronia</i> , <i>Lndl.</i>	<i>Pterochilus</i> , <i>Hook.</i>
<i>Acianthera</i> , <i>Schw.</i>	<i>Stenoglossum</i> , <i>Kunth</i>	<i>Ensifera</i> , <i>Bl.</i>	<i>Dicnia</i> , <i>Lndl.</i>
<i>Duboisia</i> , <i>Karsk.</i>	<i>Ocromeria</i> , <i>R. Br.</i>	<i>Plexaure</i> , <i>Endl.</i>	<i>Pedilea</i> , <i>Lndl.</i>
<i>Dialissa</i> , <i>Lndl.</i>	<i>Aspegrenia</i> , <i>Pöpp.</i>	<i>Titania</i> , <i>Endl.</i>	<i>Malaxis</i> , <i>Swz.</i>
<i>Stelis</i> , <i>Sicz.</i>	<i>Liparis</i> , <i>Rich.</i>	<i>Empusa</i> , <i>Lndl.</i>	<i>Calypso</i> , <i>Sal.</i>
<i>Humboldtia</i> , <i>F. P.</i>	<i>Sturmia</i> , <i>Rehb.</i>	<i>Empusaria</i> , <i>Rehb.</i>	<i>Cythrea</i> , <i>Sal.</i>
<i>Stigmato-stalix</i> , <i>Rhb.</i>	<i>Alipsa</i> , <i>Hffmg.</i>	<i>Platystylis</i> , <i>Bl.</i>	<i>Norna</i> , <i>Wall.</i>
	<i>Cestichis</i> , <i>Thou.</i>	<i>Gastroglottis</i> , <i>Bl.</i>	<i>Orchidium</i> , <i>Swz.</i>
	<i>Distichis</i> , <i>Thouars.</i>		

SUB-TRIBE 2. *DENDROBIDÆ*.—*Column incumbent from the ovary, considerably lengthened at the base.*

GENERA AND SYNONYMES.

<i>Dendrobium</i> , <i>Sicz.</i>	<i>Diploconchium</i> ,	<i>Diphyces</i> , <i>Bl.</i>	<i>Bolbophylloopsis</i> , <i>Id.</i>
<i>Gastrium</i> , <i>Bl.</i>	<i>[Schauer.]</i>	<i>Tribrachium</i> , <i>Lndl.</i>	<i>Bolbophyllaria</i> , <i>Reh.</i>
<i>Ceraia</i> , <i>Lour.</i>	<i>Oxystophyllum</i> , <i>Bl.</i>	<i>Odontostylis</i> , <i>Bl.</i>	<i>Acrochane</i> , <i>Lndl.</i>
<i>Keranthus</i> , <i>Lour.</i>	? <i>Diglyphis</i> , <i>Bl.</i>	<i>Gersinia</i> , <i>Ner.</i>	<i>Sunipia</i> , <i>Lndl.</i>
<i>Bontia</i> , <i>Petiv.</i>	<i>Diglyphosa</i> , <i>Bl.</i>	<i>Macrolepis</i> , <i>A. R.</i>	<i>Trias</i> , <i>Lndl.</i>
<i>Latouria</i> , <i>Bl.</i>	<i>Monomeria</i> , <i>Lndl.</i>	<i>Malachadenia</i> , <i>Lndl.</i>	<i>Thelychiton</i> , <i>Endl.</i>
<i>Ma:rostomium</i> , <i>Bl.</i>	<i>Epicerianthes</i> , <i>Bl.</i>	<i>Didactyle</i> , <i>Lndl.</i>	<i>Cochlia</i> , <i>Bl.</i>
<i>Aporum</i> , <i>Bl.</i>	<i>Drymoda</i> , <i>Lndl.</i>	<i>Xiphyzusa</i> , <i>Reh.</i>	<i>Lyræa</i> , <i>Lndl.</i>
<i>Schismoceras</i> , <i>Prll.</i>	<i>Bolbophyllum</i> , <i>Thou.</i>	<i>Taurostalix</i> , <i>Rehb.f.</i>	<i>Megaclinium</i> , <i>Lndl.</i>

Cirrhopetalum, [Lindl.	Bryobium, <i>Lindl.</i>	Dendrolirium, <i>Bl.</i>	Aggeianthus, <i>Wt.</i>
Zygoglossum, [Reinw.	Conchidium, <i>Griff.</i>	Pinalia, <i>Ham.</i>	Lichenora, <i>Wight.</i>
? Sestochilus <i>K & H</i>	Mycaranthes, <i>Bl.</i>	Xiphosium, <i>Griff.</i>	Corallorhiza, <i>Hall.</i>
	Phreatia, <i>Lindl.</i>	Cœlia, <i>Lindl.</i>	Aplectrum, <i>Nutt.</i>
	Eria, <i>Lindl.</i>	Porpax, <i>Lindl.</i>	Aphyllorchis, <i>Bl.</i>

TRIBE 2. Epidendræ.—Pollen cohering in definite waxy masses, with elastic powdery caudicles frequently plaited, without a gland. Anther terminal, opening by a lid. Epiphytes rarely terrestrial, caulescent, or with pseudo-bulbs, very rarely with fleshy roots.

GENERA AND SYNONYMES.

CELOGYNIIDÆ.	Diothonea, <i>Lindl.</i>	Barkeria, <i>Knls.</i>	Mitopetalum, <i>Bl.</i>
Acanthoglossum, <i>Bl.</i>	Gastropodium <i>Lindl.</i>	Broughton, <i>R. Br.</i>	Tainia, <i>Bl.</i>
Cœlogyne, <i>Lindl.</i>	—	? Chysis, <i>Lindl.</i>	Spathoglottis, <i>Bl.</i>
Chelonanthera <i>Bl.</i>	LELIADÆ.	Lælia, <i>Lindl.</i>	Paxtonia, <i>Lindl.</i>
Neogyua, <i>Rehb. f.</i>	Epidendrum, <i>L.</i>	Analisa, <i>Rehb.</i>	Collabium, <i>Bl.</i>
Androgyne, <i>Griff.</i>	Seraphyta, <i>Fisch.</i>	Larliopsis, <i>Lindl.</i>	Cytheris, <i>Lindl.</i>
Panisea, <i>Lindl.</i>	Pinelia, <i>Lindl.</i>	Cattleya, <i>Lindl.</i>	Nephelaphyllum, [Bl.
Pleione, <i>Don.</i>	Hemiscleria, <i>Lindl.</i>	Schomburgkia <i>Lindl.</i>	Pesomeria, <i>Lindl.</i>
Gomphostylis, <i>Wt.</i>	Grstedella, <i>Rehb. f.</i>	Tetramicra, <i>Lindl.</i>	Ipsca, <i>Lindl.</i>
Bolborchis, <i>Mor.</i>	Pseudepidendrum,	Leptotes, <i>Lindl.</i>	? Pachystoma, <i>Bl.</i>
Trichosma, <i>Lindl.</i>	<i>Rehb. f.</i>	Brasavola, <i>Lindl.</i>	Apaturia, <i>Lindl.</i>
Dilochia, <i>Lindl.</i>	Physinga, <i>Lindl.</i>	—	? Cremastra, <i>Lindl.</i>
Pholidota, <i>Lindl.</i>	Ponera, <i>Lindl.</i>	BLETIDÆ.	Hyacinthorchis, [Bl.
Ptilocnema, <i>Don.</i>	Nemaconia, <i>Knls.</i>	Phaius, <i>Lour.</i>	Ania, <i>Lindl.</i>
Crinouia, <i>Bl.</i>	? Aspegrenia, <i>P. & E.</i>	Pachyna, <i>Sal.</i>	? Callostylis, <i>Bl.</i>
Otochilus, <i>Lindl.</i>	Hexadesmia <i>Brongn.</i>	Tankervillea, <i>Lk.</i>	Tylostylis, <i>Bl.</i>
Earia, <i>Lindl.</i>	Hexopia, <i>Batem.</i>	Arundina, <i>Bl.</i>	Ceratum, <i>Bl.</i>
—	Dinema, <i>Lindl.</i>	Calclyna, <i>Rehb. f.</i>	Cylindrolobus, <i>Bl.</i>
ISOCHILIDÆ.	Sophronitis, <i>Lindl.</i>	Thunia, <i>Rehb. f.</i>	? Trichotosia, <i>Bl.</i>
Isochilus, <i>R. Br.</i>	Alamania, <i>Llav.</i>	Evelyna, <i>P. & E.</i>	? Plocoglottis, <i>Bl.</i>
Hexisea, <i>Lindl.</i>	Euothonia, <i>Rehb. f.</i>	Bletia, <i>R. & P.</i>	? Pachychilus, <i>Bl.</i>
? Elleanthus, <i>Prl.</i>	Hartwegia, <i>Lindl.</i>	Gyas, <i>Sal.</i>	
	Arpophyllum, <i>Llav.</i>	Thiebaudia, <i>Colla</i>	

TRIBE 3. Vandæ.—Pollen cohering in definite waxy masses, having an elastic caudicle adhering to the gland on the stigma. Anther terminal, rarely dorsal, opening with a lid. Epiphytes or rarely terrestrial. The American species mostly furnished with pseudo-bulbs; the Asiatic generally caulescent.

GENERA AND SYNONYMES.

SARCANTHIDÆ.	Pseudovanda,	Arachnanthe, <i>Bl.</i>	Saccochilus, <i>Bl.</i>
Eulophia, <i>R. Br.</i>	[Lindl.	Phalænopsis, <i>Bl.</i>	Gastrochilus, <i>Don</i>
Orthochilus, <i>A. R.</i>	Mesoclastes <i>Lindl.</i>	Stauroglottis,	Robiquetia, <i>Gaud</i>
Galeandra, <i>Lindl.</i>	Birchca, <i>A. Rich.</i>	[Schauer.	Gussonca, <i>A. R.</i>
Corydandra, <i>Rehb</i>	Cottonia, <i>Wight.</i>	Diplocentrum, <i>Lindl.</i>	Rhyuchostylis, <i>Bl.</i>
Cyrtopera, <i>Lindl.</i>	Pattonia, <i>Wight.</i>	Microsaccus, <i>Bl.</i>	Carteretia, <i>A. R.</i>
Hypodematium,	Vanda, <i>R. Br.</i>	Camarotis, <i>Lindl.</i>	Sarcochilus, <i>R. Br.</i>
[A. R.	Fieldia, <i>Gaud.</i>	Chiloschista, <i>Lindl.</i>	Tæniophyllum, <i>Bl.</i>
Lissochilus, <i>R. Br.</i>	Renanthera, <i>Lour.</i>	Gunua, <i>Lindl.</i>	Cleisostoma, <i>Bl.</i>
Doritis, <i>Lindl.</i>	Arachnis, <i>Bl.</i>	Micropera, <i>Lindl.</i>	Polychilos, <i>K & H.</i>
Luisia, <i>Gaud.</i>	Nephrauthera,	Arhynchium, <i>Lindl.</i>	Ceratostylis, <i>Bl.</i>
	[Hassk.	Saccolabium, <i>Lindl.</i>	Ephippium, <i>Bl.</i>

Ceratochilus, *Bl.*
Omœa, *Bl.*
Echioglossum, *Bl.*
Sarcanthus, *Lindl.*
Pteroceras, *Hass.*
Agrostophyllum, *Bl.*
Adenoncos, *Bl.*
Ceœoclades, *Lindl.*
Trichoglottis, *Bl.*
Aërides, *Loar.*
Dendrocolla, *Bl.*
Cuculla, *Bl.*
Tubera, *Bl.*
Fornicaria, *Bl.*
Pilearia, *Lindl.*
Ornithochilus,

[*Wall.*

Wailesia, *Lindl.*
Leopardanthus *Bl.*
Ornitharium, *Lindl.*
Schœnorchis, *Bl.*
Aëranthus, *Lindl.*
Cryptopus, *Lindl.*
Beclardia, *A. R.*
œonia, *Lindl.*
Angræcum, *Thou.*
Acrobion, *Sp.*
Listrotachys, *Richb. f.*
Mystacidium, *Lindl.*
Microœlia, *Lindl.*
Appendicula, *Bl.*
Metachilum, *Lindl.*
Podochilus, *Bl.*
Platysma, *Bl.*
Placostigma, *Bl.*
Apista, *Bl.*
Hexadœsmia *R. Br.*
? Blumea, *Meyer.*
Cryptoglottis, *Bl.*
Glomera, *Bl.*
Josephia, *Wight.*
Thelasis, *Bl.*
Oxyanthera
Tetrapeltes, *Wall.*
? Conchochilus *Hass.*
? Todaroa, *A. R.*

CRYPTOCHILIDÆ.

Cryptochilus, *Wall.*
Sehtimnia, *Linden.*
Acanthophippium,
 [*Bl.*
? Anthogonium,
 [*Wall.*

BRASSIDÆ.

Cymbidium, *Schw.*
Cyperorchis, *Bl.*
Boibidium, *Lindl.*

Grammatophyllum,
 [*Bl.*
Gabertia, *Gaud.*
Stauroglottis, *Schau.*
Bromheadia, *Lindl.*
Ansellia, *Lindl.*
Aganisia, *Lindl.*
Epiphora, *Lindl.*
Aspasia, *Lindl.*
Trophianthus,
 [*Scheid.*

? Acriopsis, *Bl.*
Trichopilia, *Bl.*
Helcia, *Lindl.*
Eriopsis, *Lindl.*
Pseuderioopsis, *Richb.*
Bracthia, *Richb.*
Chondrorhyncha,
 [*Lindl.*

Dignanthe, *Lindl.*
Nanodes, *Lindl.*
Pilumna, *Lindl.*
Dipodium, *R. Br.*
? Armadorum,
 [*Kuhl. & H.*

Dichœa, *Lindl.*
Fernandezia, *R. & P.*
Lockhartia, *Hook.*
Phymatidium, *Lindl.*
Leochilus, *Knls.*
Oncidium, *Schw.*
Cyrtochilum, *Kth.*
Odontoglossum,
 [*Knth.*

Cochlioda, *Lindl.*
Solenidium, *Lindl.*
Miltoniastrum,
 [*Richb. f.*

Rhynchostele.
 [*Richb. f.*

Abola, *Lindl.*
Oncodia, *Lindl.*
Brassia, *R. Br.*
Miltonia, *Lindl.*
Macrochilus, *Knls.*

PACHYPHYLLIDÆ.

Nasonia, *Lindl.*
Centropetalum, *Ldl.*
Pachyphyllum, *Kth.*

MAXILLARIDÆ.

Stanhopœa, *Frost.*
Ceratochilus *Lodd.*
Stanhopeastrum,
 [*Richb.*
Houlletia *A. Brongn.*
Peristeria, *Hook.*
Eckardia, *Richb.*

Acineta, *Lindl.*
Lycomormium *Richb.*
Lacœna, *Lindl.*
Cuitlauzina, *Llav.*
Govenia, *Lindl.*
Eucnemis, *Lindl.*
Agnidium, *Lindl.*
Batemannia, *Lindl.*
Gongora, *Fl. Per.*
Acropera, *Lindl.*
Coryanthes, *Hook.*
Chœnanthe, *Lindl.*
Cœlia, *Lindl.*
Ornithidium, *Sal.*
Trigonidium, *Lindl.*
Mormolyce, *Fenzl.*
Psittacoglossum *Llv.*
Stenia, *Lindl.*
Promœna, *Lindl.*
Grobya, *Lindl.*
Warœa, *Lindl.*
Warczewiczella,
 [*Richb. f.*

Kefersteinia *Richb. f.*
Paradisanthus,
 [*Richb. f.*

Acacallis, *Lindl.*
Cheiradenia, *Lindl.*
Huntleya, *Lindl.*
Zygopetalum, *Hook.*
Bitrenaria, *Lindl.*
Stenocoryne, *Lindl.*
Maxillaria, *Fl. Per.*
Heterotaxis *Lindl.*
Cryptosanus, *Schw.*
Ione, *Lindl.*
Lycaste, *Lindl.*
Anguloa, *Fl. Per.*
Camaridium, *Lindl.*
Siagonanthus, *P. & E.*
Scuticaria, *Lindl.*
Scaphyglottis, *P. & E.*
Cladobium, *Lindl.*
Colax, *Lindl.*
Paphinia, *Lindl.*
Polystachya, *Hook.*
Galectia, *A. Rich.*

CATASETIDÆ.

Catasetum, *Rich.*
Monachanthus,
 [*Lindl.*
Mormodes, *Lindl.*
Cyclosia, *Klotz.*
Clowesia, *Lindl.*
Cynoches, *Lindl.*
Cyrtopodium, *R. Br.*
Tyiochilus, *Nees.*

NOTYLIDÆ.

Notylia, *Lindl.*
Cirrhaea, *Lindl.*
Zygostates, *Lindl.*
Dactylostyles,
 [*Scheidw.*
Erycina, *Lindl.*
Ornithocephalus,
 [*Hook.*
Trophianthus, *Sch.*
Cryptarrhœna, *R. Br.*
Orchidofunkia, *A.*
 [*Rich.*
Clynhymenia, *A.*
 [*Rich.*
Macradenia, *R. Br.*
Sutrina, *Lindl.*
Trizeuxis, *H. B. K.*
Hofmeisterella,
 [*Richb. f.*
Trichoceros, *H. B. K.*
Trizeuxis, *Lindl.*
Queckettia, *Lindl.*

IONOPSIDÆ.

Rodriguezia, *R. & P.*
Gomezia, *R. Br.*
Mesospinidium,
 [*Richb. f.*
Neodryas, *Richb. f.*
Cohnia, *Richb. f.*
Papperitzia, *Richb. f.*
Scœlochilus, *Klotz.*
Burlingtonia, *Lindl.*
Ionopsis, *H. B. K.*
Iantha, *Hook.*
Cybelion, *Sp.*
Diadenium, *P. & E.*
Compactia, *P. & E.*
Trichocentrum *P. & E.*
Acoidium, *Lindl.*
Plectrophora,
 [*Focke.*
Calanthe, *R. Br.*
Centrosia, *A. R.*
Alismorchis,
 [*Thouars.*
Amblyglottis, *Bl.*
Styloglossum, *K.*
 [*& H.*
Limatodes, *Bl.*
Ghiesbœrtia, *A. R.*
Tipularia, *Nutt.*
Anthiericles, *Raf.*
Geodorum, *Jacks.*
Otandra, *Sal.*
Cistella, *Bl.*

TRIBE 4. *Ophryeæ*.—Pollen cohering in numerous loose powdery granules. Anther terminal, erect. Flowers all galeate. Terrestrial herbs, with tuberculous roots, and flat, succulent leaves.

GENERA AND SYNONYMES.

SERAPIADÆ.	SATYRIADÆ.	?Centrocchilus, [Schauer.	Bucculina, Lindl.
Orchis, <i>L.</i>	Pachites, <i>Lindl.</i>	Ate, <i>Lindl.</i>	—
Anacamptis, <i>L. C. R.</i>	Satyrium, <i>Swartz.</i>	Bonatea, <i>W.</i>	DISIDÆ.
Nigritella, <i>L. C. R.</i>	Dipleetrum, <i>LCR</i>	Bilabrella, <i>Lindl.</i>	Disa, <i>Berg.</i>
Aceras, <i>R. Br.</i>	Satyridium, <i>Lindl.</i>	Stenoglottis, <i>Lindl.</i>	Schizochilus <i>Sonder</i>
Loroglossum <i>LCR</i>	Aviceps, <i>Lindl.</i>	Diplomeris, <i>Don.</i>	Monadenia, <i>Lindl.</i>
Mimantoglossum, [<i>Sp.</i>	GYMNADENIDÆ.	Diplochilus, <i>Lindl.</i>	Schizodium, <i>Lindl.</i>
Tinra, <i>Bivona.</i>	Aopla, <i>Lindl.</i>	Paragnathis, <i>Sp.</i>	Penthea, <i>Lindl.</i>
Neotinea, <i>Rehb. f.</i>	Herminium, <i>R. Br.</i>	Bicornella, <i>Lindl.</i>	Forficaria, <i>Lindl.</i>
Thisbe, <i>Falc.</i>	Arachnites <i>Hoffm</i>	Cynorchis, <i>Thouars.</i>	Herschelia, <i>Lindl.</i>
Serapias, <i>L.</i>	Chamaerpes, <i>Sp.</i>	? Amphorchis, [<i>Thou.</i>	Braehycorythis, <i>Ldl</i>
Helleborine, <i>Pers</i>	Derocera, <i>Rehb. f.</i>	Cæloglossum, <i>Lindl.</i>	Brownlcea, <i>Harv.</i>
Ophrys, <i>Swartz.</i>	Gymnadenia, <i>R. Br.</i>	Lindblomia, <i>Fries</i>	CORYCIDÆ.
Hemipilia, <i>Lindl</i>	Sieberia, <i>Sp.</i>	Ommatodium, <i>Lindl</i>	Pterygodium, <i>Swz.</i>
Glossaspis, <i>Sp.</i>	Platanthera, <i>L. C. R.</i>	—	Corycium, <i>Swz.</i>
Glossula, <i>Lindl.</i>	Mecosa, <i>Bl.</i>	HOLOTRICHIDÆ.	Disperis, <i>Swz.</i>
Cheradoplectron, [<i>Schauer.</i>	Peristylus, <i>Bl.</i>	Holothrix, <i>L. C. R.</i>	Dipera, <i>Sp.</i>
Perularia, <i>Lindl.</i>	Cybele, <i>Falc.</i>	Saccidium, <i>Lindl.</i>	Dryopcia, <i>Thou.</i>
Bartholina, <i>R. Br.</i>	Benthamia, <i>A. R.</i>	Monotris, <i>Lindl.</i>	Ceratandra, <i>Lindl.</i>
Lathrisia, <i>Swz.</i>	Habenaria, <i>W.</i>	Scopularia, <i>Lindl.</i>	Calota, <i>Harv.</i>
	Dissorhynchium, [<i>Schauer.</i>	Tryphia, <i>Lindl.</i>	Arnottia, <i>A. Rich.</i>

TRIBE 5. *Arethuseæ*.—Pollen powdery, or cohering in small granules. Anther terminal, opening by a lid. Generally terrestrial herbs, seldom epiphytes. Leaves membranous, grass-like, sometimes reticulated, or plaited or fleshy, without a sheath, and completely articulated to the stem.

GENERA AND SYNONYMES.

LIMODORIDÆ.	Lyperanthus, <i>R. Br.</i>	POGONIDÆ.	GASTRODIDÆ.
Chloræa, <i>Lindl.</i>	Microtis, <i>R. Br.</i>	Pogonia, <i>Juss.</i>	Gastrodia, <i>R. Br.</i>
Epipactis,	—	Triphora, <i>Nutt.</i>	Epiphanes, <i>Bl.</i>
Asarca, <i>Lindl.</i>	ACIANTHIDÆ.	Nervilia, <i>Comm.</i>	Ceratopsis, <i>Lindl.</i>
Gavilea, <i>Pöpp.</i>	Acianthus, <i>R. Br.</i>	Odontotis, <i>Raf.</i>	Gamoplexis, <i>Falc.</i>
Bipinnula, <i>Comm.</i>	Chiloglottis, <i>R. Br.</i>	Isotria, <i>Raf.</i>	Epipogium, <i>Gmel.</i>
Bicneria, <i>Rehb. f.</i>	Cryptostylis, <i>R. Br.</i>	Rophostemon, <i>Bl</i>	—
Limodorum, <i>T.</i>	Corysanthes, <i>R. Br.</i>	Cordyla, <i>Bl.</i>	VANILLIDÆ.
Cephalanthera, [<i>L. C. R.</i>	Calcearia, <i>Bl.</i>	Leucorchis, <i>Bl.</i>	Cyathoglottis, <i>P & E.</i>
Macdonaldia, <i>RCun</i>	Corybas, <i>Sal.</i>	Podanthera, <i>Wight</i>	Fregea, <i>Rehb. f.</i>
Eriochilus, <i>R. Br.</i>	Stelocorys, <i>Endl</i>	Apatalon, <i>Wight.</i>	Sobralia, <i>R. & P.</i>
Diplodium, <i>Swz.</i>	Nematoceas, <i>Hookf</i>	Didymoplexis, <i>Griff</i>	Epistephium, <i>Knth.</i>
Caladenia, <i>R. Br.</i>	Pterostylis, <i>R. Br.</i>	Codonorchis, <i>Lindl.</i>	Erythrorchis, <i>Bl.</i>
Caloneima, <i>Lindl.</i>	CALEYIDÆ.	Arethusa, <i>Gronov.</i>	Hæmatorchis, <i>Bl.</i>
Adenochilus, <i>Hook.</i>	Calceya, <i>R. Br.</i>	Haplostellis, <i>A. R.</i>	Cyrtosia, <i>Bl.</i>
Leptoceras, <i>R. Br.</i>	Caleana, <i>R. Br.</i>	Cleistes, <i>L. C. R.</i>	Pogochilus, <i>Falc.</i>
Glossodia, <i>R. Br.</i>	Drakæa, <i>Lindl.</i>	Calopogon, <i>R. Br.</i>	Vanilla, <i>Swartz.</i>
Elythranthe <i>Endl</i>	Spiculaea, <i>Lindl.</i>	Catheca, <i>Sal.</i>	
		Crybe, <i>Lindl.</i>	

TRIBE 6. *Neottieæ*.—Pollen powdery, or loosely cohering in small granules. Anther dorsal, almost parallel with the stigma, or with the face of the column. Terrestrial herbs, sometimes accidentally epiphytes. Leaves membranous, sword-shaped, or petiolate, frequently enlarged into a sheath that encompasses the stem.

GENERA AND SYNONYMES.

<p>CRANICHIDÆ.</p> <p><i>Ponthieva</i>, <i>R. Br.</i> <i>Schœnleinia</i> <i>Klotz</i> <i>Pterichis</i>, <i>Lindl.</i> <i>Acræa</i>, <i>Lindl.</i> <i>Cryptostylis</i>, <i>R. Br.</i> <i>Zosterostylis</i>, <i>Bl.</i> <i>Gomphichis</i>, <i>Lindl.</i> <i>Stenoptera</i>, <i>Lindl.</i> <i>Altensteinia</i>, <i>Knth.</i> <i>Cranichis</i>, <i>Suz.</i> <i>Tripleura</i>, <i>Lindl.</i> <i>Chlorosa</i>, <i>Bl.</i> <i>Ocampoa</i>, <i>A. R.</i> <i>Prescottia</i>, <i>Lindl.</i> <i>Decaisnea</i>, <i>Brog.</i> <i>Galeoglossum</i> <i>AR</i></p>	<p><i>Calochilus</i>, <i>R. Br.</i> <i>Epipactis</i>, <i>Hall.</i> <i>Scrapias</i>, <i>Pers.</i></p> <p>—</p> <p>SPIRANTHIDÆ.</p> <p><i>Cnemidia</i>, <i>Lindl.</i> <i>Decaisnea</i>, <i>Lindl.</i> <i>Spiranthes</i>, <i>L. C. R.</i> <i>Ibidium</i>, <i>Sal.</i> <i>Cyclopogon</i>, <i>Prsl.</i> <i>Gyrostachys</i> <i>Pers</i> <i>Stenoptera</i>, <i>Prsl.</i> <i>Sarcoglottis</i>, <i>Prsl</i> <i>Cordylestylis</i>, <i>Falc</i> <i>Stenorhynchus</i> <i>Rich</i> <i>Sauroglossum</i> <i>Lindl</i> <i>Pelcxia</i>, <i>Poit.</i></p> <p>—</p>	<p><i>Cionisaccus</i>, <i>Khl.</i> <i>Chæradoplectron</i>, <i>[Schr.</i> <i>Monochilus</i>, <i>Bl.</i> <i>Haplochilus</i> <i>Endl</i> <i>Cheirostylis</i>, <i>Bl.</i> <i>Myoda</i>, <i>Lindl.</i> <i>Hæmaria</i>, <i>Lindl.</i> <i>Hylophila</i>, <i>Lindl.</i> <i>Ætheria</i>, <i>Bl.</i> <i>Platylepis</i>, <i>A. R.</i> <i>Goodyera</i>, <i>R. Br.</i> <i>Leucostachys</i>, <i>[Hffg.</i> <i>Gonogona</i>, <i>Lk.</i> <i>Tussaca</i>, <i>Raf.</i> <i>Eucosia</i>, <i>Bl.</i> <i>Gcorchis</i>, <i>Lindl.</i> <i>Macodes</i>, <i>Bl.</i> <i>Tropidia</i>, <i>Lindl.</i> <i>Ptychochilus</i>, <i>[Schauer.</i> <i>Ulantha</i>, <i>Hook.</i> <i>Anæctochilus</i>, <i>Bl.</i></p>	<p><i>Anæcochilus</i>, <i>Bl.</i> <i>Chrysobaphus</i>, <i>[Wall</i> <i>Orchipedum</i> <i>Kuhl</i> <i>Galera</i>, <i>Bl.</i> <i>Physurus</i>, <i>L. C. R</i> <i>Microchilus</i>, <i>Pal.</i> <i>Erythroides</i>, <i>Bl.</i> <i>Psychechilos</i>, <i>Khl</i> <i>Baskervilla</i>, <i>Lindl.</i> <i>Herpysma</i>, <i>Lindl.</i></p> <p>—</p> <p>DIURIDÆ.</p> <p><i>Diuris</i>, <i>Smith.</i> <i>Orthoceras</i>, <i>R. Br.</i> <i>Prasophyllum</i>, <i>R.Br</i> <i>Burnettia</i>, <i>Lindl.</i> <i>Gcnoplesium</i>, <i>R. Br.</i></p> <p>—</p> <p>THELYMITRIDÆ.</p> <p><i>Thelymitra</i>, <i>Forst.</i> <i>Epiblema</i>, <i>R. Br.</i></p>
<p>LISTERIDÆ.</p> <p><i>Listera</i>, <i>R. Br.</i> <i>Diphyllum</i>, <i>Raf</i> <i>Neottia</i>, <i>R. Br.</i> <i>Neottidium</i>, <i>Lk.</i></p>	<p>PHYSURIDÆ.</p> <p><i>Plexaure</i>, <i>Endl.</i> <i>Chloidia</i>, <i>Lindl.</i> <i>Zeuxine</i>, <i>Lindl.</i> <i>Adenostyles</i>, <i>Bl.</i></p>		

TRIBE 7. *Cypripedææ*.—Anthers two. Pollen granular, slightly coherent. Terrestrial herbs.

GENUS AND SYNONYMES.

Cypripedium, *L.*
Criosanthes, *Raf.*
Arietinium, *Beck.*

DOUBTFUL AND LITTLE-KNOWN GENERA.

<p><i>Hysteria</i>, <i>Reinw.</i> <i>Corymbis</i>, <i>Thouars.</i> <i>Macrostylis</i>, <i>K&H</i> <i>Thrixsperrum</i>, <i>[Lour.</i></p>	<p><i>Scaredederis</i>, <i>Thou.</i> <i>Galeola</i>, <i>Lour.</i> <i>Callista</i>, <i>Lour.</i> <i>Acroria</i>, <i>I resl.</i></p>	<p><i>Scleropteris</i>, <i>Schw.</i> <i>Amblostoma</i>, <i>Schd.</i> <i>Poncrochis</i>, <i>Rehb.f</i> <i>Chaubardia</i>, <i>Rehb.f.</i></p>	<p><i>Pescatorea</i>, <i>Rehb.f.</i> <i>Sarcadenia</i>, <i>Hort.</i> <i>[Par.</i> <i>Guebina</i>, <i>Hort. Par</i></p>
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GEOGRAPHICAL DISTRIBUTION.—Natives of the whole world, except in the frozen regions, and arid places. The greatest number is in the humid forests of the torrid zone, and particularly in those of America, where they mostly grow on decayed wood, or on other plants. Those inhabiting the temperate and colder regions are generally terrestrial, though there are some instances where they are parasitical. The *Malaxidæ* are principally natives of the continent of India, and the islands of the Malayan Archipelago; a few come from tropical America, Madagascar, and the west coast of Africa;

they are very rare in Australia and Polynesia, and are quite unknown at the Cape of Good Hope, and in South America beyond the tropics. The Epidendreae are mostly natives of the tropics of America; few are found in equinoctial Asia, very few in Northern India and the borders of China, and one only in Florida and Carolina. The Vandeeae are most abundant in tropical Asia and America, rare in Africa, and very rare beyond the tropics. The Ophryeae are found in the sub-tropical and temperate regions of the whole globe, particularly in central Europe, the basin of the Mediterranean, and the Cape of Good Hope; they are rare between the tropics. The Neottieae are rare north of the tropics, very rare in Africa, but abundant at high elevations in the mountains of Asia, and in Australia beyond the tropics. The Arethuseae are most abundant in Australia, and in other temperate parts south of the tropics; but between the tropics, and in the north temperate zones of both hemispheres, they are more rare. The Cypripediinae are confined to the temperate and colder regions, particularly of the northern hemisphere, and are most abundant in America.

PROPERTIES AND USES.—This is one of the most natural, and certainly one of the most remarkable, families of the vegetable kingdom; remarkable in their habits and forms, and equally remarkable for the beauty, elegance, and fragrance of their flowers. Their flowers assume the most singular shapes, as of bees, butterflies, moths, flies, spiders, birds, reptiles, and even the human form itself. While many of them grow like other plants beneath the soil, as many delight in perching on the branches of trees, regardless of soil altogether, clasping them with their long, thick, fleshy, and succulent roots. As a family, they are not very productive of commercial products; but there are some that yield well-known substances, as, for instance, Salep and Vanilla. The roots of many contain a considerable quantity of bassorin and starch, with a bitter substance, and a small quantity of essential oil.

Salep is a substance much used as a nutritious food, in the East, and is habitually used by the Turks and Persians at their meals. It is a fecula produced by the tubers of *Orchis mascula*, and other allied species. This plant is one of our most abundant British Orchids, and is found in woods, pastures, and by waysides. It is called *Early Orchis*, *Male Orchis*, and *Male Fool's-stones*. It also grows plentifully throughout Europe, Northern Africa, and the East. In Persia, the fecula is obtained by washing the roots, and throwing them into boiling water to remove the outer skin; they are then dried, strung on cords, and hung in the sun till they are perfectly free of moisture, and will keep without injury for almost any period; they are sometimes dried in ovens. These bulbs, when thus dried, vary from the size of a cherry-stone to that of an olive, are slightly transparent, and of a horny colour; they are very difficult to pulverise, and, to facilitate the operation, they should be soaked in cold water till they become soft, and then rapidly dried. When reduced to powder, it is dissolved like other fecula, in water, milk, or broth, requiring sixty parts of liquid to to one of fecula. It is employed, in the East particularly, as a restorative, and powerful analeptic, against weakness of the forces. In Poland the decoction of Salep is the drink used in almost all diseases. It is highly nutritive, and may be used for the same purposes as sago, tapioca, and arrow-root. Dr. O'Shaughnessy states that two drachms afford a sufficient meal for an

invalid ; good salep, carefully prepared, is, in truth, one of the best articles of diet a convalescent can use. In India, the Salep of Cashmere is reckoned the best, and is obtained chiefly at the Hurdwar fair, from the Cashmere merchants. Dr. Royle considers the plant that yields Cashmere Salep is an *Eulophia*. *O. morio* (*Mcadow Orchis*, *Female Fool's-stones*) and *O. militaris* (*Man Orchis*), both natives of Britain, also supply Salep, equal in quality to that obtained from *O. mascula*, and it has been suggested that the substance might be profitably made in this country ; in the "Philosophical Transactions," vol. lix., page 1, Mr. Moulton describes the method of making it. He says the best time to gather the tubers is when the seed is formed and the stalk is going to fall, for then the new bulb, of which Salep is made, is arrived at its full size. The new roots are washed in water, the outer skin removed, and then set on a tin plate, in an oven heated to the degree of a bread oven. In six, eight, or ten minutes they will have acquired a transparency like horn, without being diminished in size ; they are thus to be removed into a room to dry and harden, which will be done in a few days, or they may be finished in a slow heat in a few hours. In North America, Salep is obtained from a species of *Habenaria*.

The fibrous roots of *Neottia nidus-avis*, interlaced like a bird's nest, were formerly considered vulnerary and resolute. The root of *Bletia verecunda* is said to be stomachic. *Spiranthus diuretica* is used in Chili as a diuretic, and *Chloræa disoides* to promote the flow of milk. The root of *Arethusa bulbosa* is employed in North America as a cure for toothache, and for stimulating sluggish tumours. *Cypripedium parviflorum* is regarded by some American practitioners as equal in virtue to Valerian, acting as a gentle stimulant, with a tendency to the nervous system. A decoction of the herb of *C. calceolus* (*Lady's Slipper*) is used in Siberia against epilepsy. Schomburgk states that the juice of *Epidendrum bifidum*, taken in doses of a tablespoonful, is purgative, and is considered in Tortola an anthelmintic and diuretic. The tubers of *Aplectrum hyemale* are so viscid that they are called *Putty-root* in the United States, and are used for cementing broken earthenware. *Angræcum fragrans* is a native of India and the Mauritius, where it is called *Faam*, *Fahum*, or *Phaum*. Its leaves are delightfully fragrant, having the odour of the Tonka bean, with the flavour of bitter almonds. In the Isle of Bourbon its infusion is in great reputation against pulmonary consumption, and as a promoter of digestion ; and in France, where it is called *Isle of Bourbon Tea*, it has been employed successfully to allay coughs, diseases of the chest, to promote digestion, dissipate spasms and oppression, and as an aid to expectoration. In Van Dieman's Land, the natives eat the masses of coral-like roots of *Gastrodia sesamoides*, which are sometimes called "native potatoes ;" but they are watery and insipid.

Vanilla was generally believed to be the fruit of *Vanilla aromatica*, but it is now supposed to be that of *V. planifolia*. It is a parasitical plant, with a long tortuous stem, twining among trees, and rising to their tops by means of suckers, after having taken root at their base, in the chinks of rocks, &c. It is found in humid, shady places in Mexico, Peru, Brazil, and Guiana, and it is cultivated in Cayenne, St. Domingo, the Mauritius, and Ceylon. The fruit, which is the part used, is straight, four to eight inches long, and three or four lines thick, slender and curved at the end next the

flower, and obtuse at the other extremity; containing, within its tough shell, a soft black pulp, in which numerous minute, black, glossy seeds are embedded; these seeds are, when the fruits open at perfect maturity, often adherent to the external surface of the pods, placed in plaits or channels, and it is then that a liquid, called *baume de vanille*, exudes; this is unknown in Europe, but it is made use of in Peru. The fruit has a strong, sweet, peculiar, and agreeable odour; a warm, aromatic, sweetish taste, and the interior pulpy matter is the most aromatic; it appears as if it contained benzoic acid, which is so abundant that it effloresces on the surface of the pods in fine needles. The pods are collected before they are ripe, and about three parts dried, then covered over with a coating of the oils, either of cocoa-nut, or castor-oil, or of *Anacardium occidentale*, to keep them pliant, to check the evaporation of the aromatic properties, and to protect them from the attacks of insects; they are then tied in bundles, surrounded with sheet lead, or enclosed in small tin boxes, and sent to market. Vanilla is an aromatic substance, cordial, balsamic, and corroborant; it raises the spirits, warms the stomach, facilitates digestion, and is one of the most powerful aphrodisiacs, if taken in a large dose. It is used by perfumers, rectifiers, and distillers; but it is principally employed in flavouring ices, sherbets, bonbons, pastry, creams, and other articles of the dessert, and particularly chocolate, to which it imparts a sweetness and a beautiful delicacy, which assists in its digestion, and makes it useful in restoring the gastric forces when they are impaired; it thus strengthens the stomach, intestines, and heart; gives strength and activity to the brain, and the mental powers, and is therefore recommended to hypochondriacs, and others whose intellect is impaired. It is almost constantly used by the people of South America. This substance is both rare and expensive. Not more than four or five hundredweight are imported into this country annually, and the price is from five to six pounds per lb. There are three varieties of it, the most valuable of which is called *lee* by the Spaniards, and is that which has been described above. The second is called *simarona*, and is similar to the first, but smaller, not so dark in colour, dryer, less aromatic and efflorescent. The third sort is called *pompona*, or *bova*, and has much broader pods than the others, very brown, soft, and viscous, almost always open, and appears to have passed maturity; it has a strong odour, less agreeable than the first, and less balsamic. *Vanilla claviculata*, a native of the West Indies, has a bitter taste and fragrant odour; it is employed by the Negroes as an antisyphilitic, and the juice as a vulnerary—hence it is called *Liane à blessure*.

ORDER CCXXXIII.—APOSTASIACEÆ—APOSTASIA FAMILY.

THESE are nearly allied to the Orchids, from which they are distinguished by their regular flowers, three-celled ovary, and by their capsules opening through the cells, the valves of which bear the partitions in the middle. Placentæ axile.

GENERA AND SYNONYMES.

Apostasia, *Bl.*
Mesodactylus, *Wall.*
Adaetylus, *Endl.*

Neuwiedia, *Bl.*
Rhynceanthera, *Bl.*

Natives of India, where they are found in damp woods. None of them are known to possess any properties.

ORDER CCXXXIV.—BURMANNIACEÆ—BURMANNIA FAMILY.

THESE are distinguished from the Orchids by their regular, tubular flowers, with three or six free stamens inserted into the tube of the coloured perianth; and resemble them in their marginal ovule-bearers, loose, reticulated seed-covering, and solid embryo.

GENERA AND SYNONYMES.

<i>Gymnosiphon</i> , <i>Bl.</i>	<i>Tetraptera</i> , <i>Miers.</i>	<i>Dictyostega</i> , <i>Miers.</i>	„ <i>Tripterella</i> , <i>Rich.</i>
<i>Gonyanthes</i> , <i>Bl.</i>	<i>Tripterella</i> , <i>Mart</i>	<i>Cymbocarpa</i> , <i>Miers.</i>	<i>Vogelia</i> , <i>Gmel.</i>
<i>Tripteranthus</i> ,	<i>Apteria</i> , <i>Nutt.</i>	<i>Ptychomeria</i> , <i>Spruce</i>	<i>Maburnia</i> , <i>Thou.</i>
[<i>Wall.</i> ,]	<i>Stemoptera</i> , <i>Mrs.</i>	<i>Burmannia</i> , <i>L.</i>	<i>Anonymus</i> , <i>Walt.</i>

Natives of the tropics of Asia, Africa, and America.



ORDER CCXXXV.—ZINGIBERACEÆ—GINGER-WORTS.

HERBACEOUS perennials, with tuberous or creeping root-stocks, and a



Fig. 223. *Amomum Danielli*. A, Fruit of *Zingiber officinale*; B, section of ditto; C, section of the seed, showing the embryo.

simple stem, formed by the cohering bases of the leaves. *Leaves* simple, sheathing at the base. *Flowers* hermaphrodite, irregular, frequently very large, rarely solitary, arranged in spikes or panicles, and rising from the axils of spathaceous bracts. *Perianth* double, the exterior shorter than the interior, both formed of three divisions; on the inside of the inner series are three or four petal-like appendages, larger than the divisions, one of which is sometimes larger than the others, and resembles the labellum in Orchids; these appendages are abortive stamens. *Stamens* three, distinct, of which two lateral are abortive, and the middle one fertile; *anther*

two-celled, opening longitudinally; filament cylindrical or flat. *Ovary* three-celled, many-ovuled; *ovules* attached to central ovule-bearers; *style* slender, cylindrical, or flat; *stigma* dilated, hollow. *Fruit* generally a three-celled, three-valved capsule, opening through the cells; rarely fleshy, one-celled, and one-seeded by abortion, and unopening. *Seeds* numerous, with floury albumen, containing a straight embryo, enclosed within a vitellus.

GENERA AND SYNONYMES.

<i>Globba</i> , L.	„ <i>Hura</i> , König.	<i>Ceratanthera</i> , Horn.	<i>Dietrichia</i> , Giesk.
<i>Catimbium</i> , Juss.	<i>Sphærocarpus</i> ,	<i>Mantisia</i> , Curt.	<i>Casumunar</i> , Colla
<i>Colebrookia</i> , Don.	[<i>Gawl.</i>	<i>Zingiber</i> , Gärtl.	<i>Lampujang Rmph</i>
<i>Ceranthra</i> , Horn	<i>Manitia</i> , Giesk.	<i>Jägera</i> , Giesek.	<i>Curcuma</i> , L.

Zerumbet, <i>Rumph.</i>	Paludana, <i>Gsk.</i>	Peperidium, <i>Lindl.</i>	Heritiera, <i>Retz.</i>
Stissera, <i>Giesek.</i>	Etlingera, <i>Gsk.</i>	Achasma, <i>Griff.</i>	Languas, <i>Kön.</i>
Erndlia, <i>Giesek.</i>	Elettaria, <i>Rheede.</i>	Stenochasma, <i>Griff.</i>	Monolophus, <i>Wall.</i>
Kæmpferia, <i>L.</i>	Matonia, <i>Sm.</i>	Alpinia, <i>L.</i>	Cenolophon, <i>Bl.</i>
Soncorus, <i>Rumph.</i>	Cardamomum, <i>Sal.</i>	Zerumbet, <i>Jacq.</i>	Costus, <i>L.</i>
Trilophus, <i>Lestib.</i>	Geanthus, <i>Reinw.</i>	Costus, <i>Pers.</i>	Tsjana, <i>Gmel.</i>
Roscoeæ, <i>Smith.</i>	Donacodes, <i>Bl.</i>	Ethanium, <i>Sal.</i>	Planera, <i>Giesek.</i>
Amomum, <i>L.</i>	Diracodes, <i>Bl.</i>	Allughas, <i>L.</i>	Banksia, <i>Kön.</i>
Cardamomum,	Hedychium, <i>König.</i>	Buckia, <i>Giesek.</i>	Hellemia, <i>Retz.</i>
[<i>Rumph.</i>	Gandsulium,	Catimbium, <i>Lest.</i>	Glissanthe, <i>Sal.</i>
Marenga, <i>Sal.</i>	[<i>Rumph.</i>	Leptosolena, <i>Presl.</i>	Jacuanga, <i>Lestib.</i>
Alexis, <i>Sal.</i>	Gamochilus, <i>Lestib.</i>	Gastrochilus, <i>Wall.</i>	Monocystis, <i>Lindl.</i>
Hornstedtia, <i>Retz.</i>	Renealmia, <i>L.</i>	Hellenia, <i>W.</i>	Kolowratia, <i>Presl.</i>
Meistera, <i>Giesek.</i>	Alpinia, <i>Bl.</i>	Albina, <i>Giesek.</i>	Nyctophylax, <i>Zipp.</i>
Wurfbainia, <i>Gsk.</i>	Gethyra, <i>Sal.</i>	Martensia, <i>Giesek.</i>	Hitchenia, <i>Wall.</i>
Greenwaya, <i>Gsk.</i>			

GEOGRAPHICAL DISTRIBUTION.—The most are natives of the tropics, and some are sub-tropical in Japan. The greatest number is found in Asia, but they are very rare in Africa and America.

PROPERTIES AND USES.—This family is an important one, and too little is known of its uses; being all natives of the tropics, few opportunities have been afforded for investigating their products. It is more particularly the roots and the seeds of these plants that are useful; many have large fleshy roots, used in medicine as stimulants and stomachics, in domestic economy as condiments, and in perfumery; they contain a volatile oil, which can be extracted by distillation.

Ginger (*Zingiber officinale*) is a native of India, the Moluccas, and China, where it is cultivated with assiduity; it was transported thence to the West Indies and Sierra Leone, where it forms an important feature in the commercial products of these countries also. It is the creeping, fleshy root-stocks of this plant that form the ginger of commerce. These are dug up when a year old, generally in January and February, after the stems have withered. After being properly cleaned, they are scalded with boiling water to prevent germination, and then rapidly dried. This constitutes what is known in commerce as *Black* or *East India Ginger*. In Jamaica the best roots are selected and deprived of their outer skin, or epidermis, and then carefully and separately dried in the sun; this gives them a beautiful white colour, and they are known as *Jamaica Ginger*. It is thought by some botanists and pharmacologists that these are produced by two different varieties; Guibourt is of this opinion, and cites the authority of Rumphius, who distinguished them as *Z. album* and *Z. rubrum*; the latter is supposed to furnish the East Indian, which, being of a yellow colour internally, less fibry, heavier, more highly aromatic and oily, and with a much more pungent and acrid taste; and beneath the yellow epidermis there being a brown or red layer, which is also a distinguishing character of the Red Ginger of Rumphius, it is identified with that variety. When fresh, and before it has become too old and stringy, the root is preserved in sugar, and forms a dessert dish highly esteemed; the Chinese variety is the best of this article, as it is preserved in a younger state than that made in India. Ginger is stimulant and carminative, and, besides being used in domestic economy as a condiment, is administered medicinally

in dyspepsia, flatulent colic, and a feeble state of the alimentary canal. It is composed of a resinous matter, soft, acrid, aromatic, and soluble in ether or alcohol; a volatile oil of a greenish-blue colour; free acetic acid; acetate of potass; osmazome; gum; vegeto-animal matter; sulphur; starch; and lignin.

From the roots of *Zingiber casumunar*, the article known in commerce as *Casumunar*, or *Yellow Zedoary*, is obtained. This is much larger than ginger, of a hot, bitterish taste, and was formerly known in Europe by the name of *Bengal Root*. In the year 1672, a medical practitioner of the name of Peachy made a large fortune by the administration of this root, which he justly extolled as stomachic and digestive; but he also attributed to it the property of curing headaches, hysteria, apoplexy, and epilepsy, and failing to do so it gradually fell into disuse. It is in the present day seldom met with either among druggists or in commerce. The roots of *Z. zerumbet*, which is cultivated in Java, and erroneously called *Round Zedoary*, are of a large size, having an acrid, slightly bitter, and aromatic taste, and an agreeable odour. Rheede states that the natives mix it with their bread in times of scarcity, and call it *Kna*. Desvaux says that they mix the juice with the deadly poison they call *Ipo* (see page 680.) *Z. mioga* grows in the neighbourhood of Negasaki in Japan, and has a hot, pungent root like ginger, and is used for the same purposes. *Z. dubium* grows in Guinea, and is esteemed as a medicinal aromatic by the natives. *Long Zedoary* is the root of *Curcuma zerumbet*, a native of the East Indies, and found at Chittagong. The root is pale-yellow internally, with a pleasant, camphor-like smell, and an aromatic, bitterish taste. *Round Zedoary* is furnished by *C. zedoaria*, called *Jedwar* in Arabia, and hence the origin of the name. This is a native of Bengal and China, and is used as a condiment; it is said to excite the digestive organs, to be a good stomachic, and an excellent vermifuge; it is highly esteemed as a powerful sudorific, and is much used by the Arabs, who also take it internally against the bites of venomous serpents. *Turmeric* is the root of *C. longa*, a native of India and Cochin China, where it is cultivated, as well as in several other parts of the East; it was formerly called *Terra Merita*, hence the origin of the name. Turmeric has an acrid, peppery, aromatic, and slightly bitter taste; it tinges the saliva yellow, and when burnt gives a crackling noise and an aromatic smoke. It consists of lignin, starch, a peculiar colouring matter called *curcumin*, a brown colouring matter, gum, an odorous and very acrid volatile oil, and a small quantity of chloride of calcium. It is a stimulant aromatic, and is used, like ginger, in the East, as a condiment; it also enters largely into the composition of Indian curry-powder. It has been largely employed in dyeing a beautiful yellow colour, which, however, is very fleeting; and it is used to make that test-paper which becomes red when brought in contact with the alkalies. *C. amada*, also a native of India, is called *Mango Ginger*, from the peculiar smell of the root when fresh. It is a gentle stimulant, but is only used for seasoning food. *East Indian Arrowroot* is obtained from the tubers of *C. angustifolia* in the Benares district, from *C. leucorrhiza* in Berar, and from *C. rubescens* in Travancore, where it is much used as an article of food.

Amomu cardamomum is a native of Java, Sumatra, and the mountainous parts of India, and its dried capsules constitute the *Round* or *Cluster*

Cardamom of the druggists; they are used for the same medicinal purposes as the true officinal *Cardamom*, but are seldom used except in the south of Europe; the seeds have a strong aromatic and somewhat camphorous flavour. *Java Cardamom* is the capsules of *A. maximum*, a native of Java and other Malayan islands; it is cultivated in the mountains of Nepal, and hence the produce is sometimes called *Nepaul* or *Bengal Cardamom*. These capsules are strongly ribbed, and, when soaked in water, exhibit from nine to thirteen membranous wings, which distinguish them from all other varieties. The seeds have a feeble aromatic taste and smell. The fruit of *A. angustifolium*, which grows in marshy grounds in Madagascar, constitutes *Madagascar Cardamom*, and are distinguished by being pointed, flattened on one side, and striated, horny, having a broad, circular scar at the bottom, surrounded by an elevated, notched, and corrugated margin. They are what were called *Greater Cardamom* by the old writers. The fruit of *A. aromaticum* is similar in shape and properties to the true cardamom. *Grains of Paradise*, called also *Guinea Grains* and *Melegueta Pepper*, are the seeds of *A. grana paradisi*, a native of the coast of Guinea near Sierra Leone, and cultivated in the West Indies, particularly in Demerara. These seeds are of a bright, golden-brown colour, excessively hot, acrid, and aromatic, and they form the favourite spice of the natives of the Guinea coast. Their effects on the system are analogous to those of pepper, but they are seldom used except in veterinary practice, and to give artificial strength to spirits, wine, beer, and vinegar; and for these they are employed to a very large extent, mixed with Chili capsicums, to impart a hot, fiery flavour to the spirit, which, to those ignorant of the imposition, passes for strength of liquor; it is on gin that this operation is chiefly practised. The true officinal, or *Malabar Cardamom*, sometimes called *Lesser Cardamom*, is the fruit of *Elettaria cardamomum*. The plant is a native of the mountains of Malabar and Canara, where it springs up spontaneously in the forests, after the removal of the undergrowth. From time immemorial, great numbers of the natives have derived a livelihood from its cultivation. It begins to yield fruit at the end of the fourth year, and continues to bear for several years afterwards. The fruit, when ripe, is gathered in November, dried over a gentle fire, and separated from the footstalks and adherent calyx by rubbing. They are much used as a spice, and a warm and grateful aromatic; they have a fragrant odour, and a warm, pungent, highly aromatic taste. These properties depend on a volatile oil, which is obtained by distillation with water, and which is colourless, of an agreeable and very penetrating odour, and of a strong, aromatic, burning, camphorous, and slightly bitter taste. The seeds contain 4.6 per cent. of volatile oil, 10.4 of fixed oil, 2.5 of a salt of potassa mixed with a colouring principle, 3.0 of starch, 1.8 of azotized mucilage, 0.4 of yellow colouring matter, and 7.73 of ligneous fibre. *E. cardamomum medium* is supposed to yield the *Wild Cardamom* of Calcutta; and the fruits of *E. cardamomum zeylanicum* are similar in all their properties to Malabar cardamoms.

Galangal Root is the root of *Alpinia galanga*, a native of Sumatra, and cultivated in the Eastern Archipelago. There are two varieties of the drug, distinguished as the *greater* and the *lesser*, but they are both obtained from the same plant, the greater being only the older roots. It was formerly in common use as a warm, stomachic bitter, and generally formed an ingredient

in bitter infusions, but is now almost wholly laid aside in consequence of its unpleasant flavour, being pungent, acrid, and aromatic. It contains a volatile oil, an acrid resin, extractive, gum, bassorin, and lignin; and Vogel, jun., found also starch and fixed oil. In India it is much used as a condiment, and even as an aliment, and it is also employed as a perfume. The roots of *A. aromatica* are highly and agreeably aromatic, and are used in Brazil as carminatives and stomachics. The fleshy, tuberous roots of *Kæmpferia galanga* are agreeably fragrant, and of a bitterish aromatic taste, and they are frequently mixed with the true galangal. The root of *Hedychium spicatum* is fragrant, warm, and stomachic. The leaves of some of the *Rencaimias* are aromatic when bruised, and are applied to pains in the limbs. The article called *Putchuk*, of which immense quantities are annually exported from India to China, for burning as incense, is not, as was formerly supposed, the root of *Costus arabicus*, but of *Aucklandia costus*, of which an account will be found at page 461. The roots of several species of *Costus* are very bitter, and formerly were held in great repute as tonics, but they are now fallen into disuse. The fruit of *Globba uvæformis* is said to be eatable.

ORDER CCXXXVI.—MARANTACEÆ—MARANTA FAMILY.

THIS family differs from the preceding merely in having one fertile, lateral stamen, with a petal-like filament, and a one-celled anther, placed opposite one of the lateral divisions of the internal perianth; and a straight, naked embryo lying in hard or floury albumen, without vitellus.

GENERA AND SYNONYMES.

Thalia, *L.*
 Peronia, *DC.*
 Maranta, *Pl.*
 Stromanthe, *Sond.*

Phrynium, *W.*
 Phyllodes, *Lour.*
 Calathea, *G. F. W. M.*
 Göppertia, *Nees.*
 Myrosma, *L. f.*

Canna, *L.*
 Cannacorus, *T.*
 Eurystylus, *Bouché.*
 Distemon, *Bouché.*

These are all natives of the tropics of Asia, Africa, and America. Unlike the Gingers, to which these are so closely allied, they are not aromatic, but are remarkable for furnishing a large quantity of fecula, or amylaceous matter, known as arrow-root and tous-les-mois.

Maranta arundinacea (Arrow-root) is a native of the West Indies, where it is extensively cultivated. It is also cultivated in some parts of the East Indies, Ceylon, Sierra Leone, and in Georgia and Florida, in the United States. In Cayenne the natives eat the root, roasted, for the cure of intermittent fevers; bruised, it is applied to arrow-wounds, and hence the origin of the English name. In Tahiti the natives make a kind of rum from the juice, which they call *tii*; when fresh, the juice is acrid, reddens the skin, and excites saliva. It is from the root-stocks of this plant that the finest *Bermuda*, or *West Indian Arrow-root*, is obtained. When a year

old, the root-stocks are taken up and well washed, and afterwards beaten to a pulp in wooden mortars, thrown into water and again washed till the fecula is removed from the fibre; the fibrous portion is then removed by hand, and the white, milky-looking fluid is strained through a coarse cloth, and allowed to stand till the fecula subsides; the supernatant water being poured off, the fecula is again washed with fresh water, and being again allowed to subside, and the water run off, it is dried in the sun on sheets. Genuine West India Arrow-root may be distinguished through the microscope by the ovate-oblong, somewhat irregular, convex shape of its granules, with very fine concentric rings, which gradually increase in size from an extremely small one, beginning at the apex, and which is called the hilum; they are less transparent than potato starch. This variety of arrow-root is distinguished by its yellowish-white colour. To test more correctly genuine Maranta arrow-root, mix a portion with twice its weight of strong muriatic acid, and it will form an opaque paste; perform the same operation with potato starch, and the result will be transparent and jelly-like. In Guiana and St. Domingo, a kind of arrow-root is also obtained, from the root-stocks of *M. allouya*, and the roasted tubercles are eaten as an article of food. *M. lutea* has large heart-shaped leaves, that are used to wrap up the resin called Caehibou, obtained from *Bursera gummifera*. On the banks of the Magdalena, the natives cover the roofs of their houses with them, because their interior surface is covered with a white calcareous coating, which renders them impermeable; this same matter, triturated with water, is employed against stranguary in the Andes of Quito. *M. ramosissima*, a native of Sylhet, furnishes an arrow-root, used as food in that country, and constituting a portion of the East India arrow-root. From the beautiful, highly-polished green stems of *M. dichotoma*, split up, the mats called in India *Sital-pati*, are made; the plant is called in Bengal *moocta-patee*. The leaves of some of the species of *Calathea* are used in South America for basket-making. The article known as *Tous-les-mois* is obtained from the root-stocks of some species of *Canna*, by some supposed to be *C. coccinea*, and by others *C. achiras*. The substance is prepared in the island of St. Kitts, and it is said that its manufacture is attended with a great deal of difficulty; it is highly nutritious, and is an excellent food for infants. *C. indica* is a native of the hot regions of both hemispheres, and is known in this country by the name of *Indian Shot*, because the hard, round seeds, like peas, are used as shot; these seeds also yield a beautiful red colour, and they are used by the natives made into chaplets; the flesh of pigeons that feed on them is rendered bitter. The root-stocks are very large, spongy, and jointed, and are used in Brazil for poultices in abscesses and tumours as emollients; they are also employed as a diuretic. The root-stocks of *C. aurantiaca* and *glauca* have much the same properties, being diuretic and diaphoretic. The root of *Thalia geniculata* is eaten by the Brazilians in times of scarcity, either roasted or boiled; and, bruised, it is employed as a local application for healing ulcers. It yields an abundance of a kind of arrow-root, and its young shoots are used as a potherb.

ORDER CCXXXVII.—MUSACEÆ—BANANAS.

HERBACEOUS perennials, without stems, or sometimes furnished with a

cylindrical bulb, elongated into the form of a stem, but very rarely presenting a woody and simple stipe.

Leaves with long foot-stalks, sheathing at the base, and with fine parallel veins, running from the mid-rib to the margin. *Flowers* hermaphrodite, often highly coloured, a number of them collected together in a spathe.

Perianth irregular, coloured, and petal-like, adherent, having six divisions, three of which are exterior and three interior; in *Musa* five of the divisions are external, and form a sort of superior lip, while the sixth, which is internal, forms an inferior lip.

Stamens six, of which one is almost constantly abortive, and assumes the form of a small concave sepal; they are inserted in the middle of the divisions; *anthers* turned inwards, two-celled, and terminated by a petal-like prolongment of the filament.

Ovary inferior, three-celled, each cell containing a great number of ovules attached to the inner angle; in *Heliconia*, they are solitary; *style* simple, terminated by a hollow three-lobed stigma. *Fruit* either a three-celled many-seeded capsule with three valves, having the partitions on the inside, or fleshy and unopening. *Seeds* sometimes encompassed by hairs, circularly arranged, and having a crustaceous covering. *Embryo* straight in the

axis of mealy albumen, with the radicle touching the hilum.

TRIBE 1. *Heliconiæ*.—Seeds solitary in the cells. Fruit a capsule bursting through the partitions.

GENUS AND SYNONYME.

Heliconia, L.

Bihai, Plum

TRIBE 2. *Uranieæ*.—Seeds numerous in the cells. Fruit fleshy and

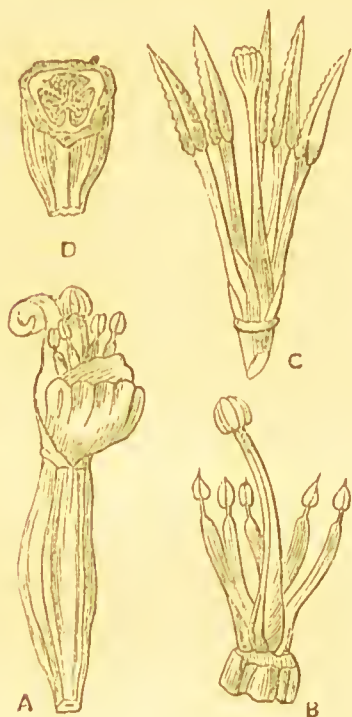


Fig. 224. A, Female flower of *Musa sapientium*; B, the same, deprived of the perianth; C, male ditto, deprived of the perianth, showing the fertile stamens; D, section of the ovary.

unopening, or capsular, and opening through the cells, the valves bearing the partitions in the middle.

GENERA AND SYNONYMES.

Musa, T.
Strelitzia, Banks.

| ? *Heliconia*, Gärtn.
| *Ravenala*, Ad.

| *Urania*, Schreb.
| *Phenacospermum*, Endl.

GEOGRAPHICAL DISTRIBUTION.—Natives of the tropics, the Cape of Good Hope, and Japan. The *Heliconias* inhabit the tropics of America. The *Uranicæ* are distributed in the tropics of both hemispheres; and the species of *Musa* are, by aid of cultivation, found in all regions adapted for their growth.

PROPERTIES AND USES.—The most interesting plants in this family are species of *Musa*, so valuable and necessary in the tropical climates. Though they assume the appearance and size of large palm-like trees, they are, in reality, only herbaceous perennials, without woody structure, and have no more the character of a tree than the Ginger or Arrow-root plants. The stems are elongated bulbs, varying in height, according to the species, from five to twenty-five feet; simple, roundish, tapering, and solid, smooth, fungous, and watery; they are generally biennial, but sometimes last longer; when cultivated in stoves in this country, they last till they produce fruit, and die; but in their native countries, where they produce fruit every year, they die down annually.

The Plantain (*Musa paradisiaca*) is a native of India, but is now cultivated throughout the tropics of Asia, Africa, and America; it is called *Pisang* in India, and *Meiu* in Tahiti. The shoots arise from buds of the root-stock, and throw up soft, spongy stems, fifteen or twenty feet high, and six to nine inches in diameter near the base. The leaves are six to eight feet long, and two to three feet broad, with a strong, fleshy mid-rib. When the plant is fully grown, spikes of flowers appear from the centre of the crown, four feet long, with nodes on one side, and these are followed by the fruit, eight or nine inches to a foot long, and an inch to an inch and a half in diameter, growing in clusters, forming a bunch sometimes upwards of forty pounds weight. The fruit is green at first, but becomes yellow when ripe; the skin is tough, and within is a very sugary pulp, like the flesh of some pears when they begin to blight, and without cells or seeds by abortion. This sort is generally pulled before it is ripe, the green skin pulled off, and the fruit roasted in a clear fire for a few minutes and frequently turned; it is then scraped and served up as bread. This plant is one of the principal sources of food in tropical climates. It is much cultivated in the West Indies; and in Jamaica, says Dr. Wright, without this fruit the island would scarcely be habitable, as no species of provision could supply its place; even flour or bread would be less agreeable and less able to support the laborious negro, or to keep him in health. As a food, the Plantain is wholesome and agreeable; it is never eaten raw, except when ripe, but, before it is so, it may be boiled and eaten as a vegetable, with meat or fish; when roasted, it is flavoured with sugar and orange-juice, and made into compôtes; it is dried in ovens or in the sun when intended for keeping, and the negroes make a pasté of it with sugar and spices, to

supply them when travelling; it is also formed into confections. Plantains also fatten horses, cattle, swine, dogs, fowls, and other domestic animals. A tree generally contains three or four clusters, thus furnishing, on an average, two hundred fruit, sufficient to keep a family for a month. Humboldt has calculated that a piece of ground 100 yards square, planted with forty plantains, would produce 4,000 lbs. weight of fruit, whilst wheat would produce only 30 lbs., and potatoes 1,000 lbs. A fermented liquor is made from the fruit. The stem yields a juice which is employed as an astringent, and has a sort of spongy, cottony pith that may be eaten when boiled and pounded, as it contains a considerable quantity of starch. The expressed juice of the stems contains nitrate of potash, oxalate of potash, and a small quantity of colouring-matter. In Tonquin the stems are burned, and the ashes used in purifying sugar. The leaves are used for napkins, tablecloths, make excellent mats, and serve for stuffing mattresses. They were supposed by the old writers to be the leaves that our first parents clothed themselves with after the fall; and the fruit to have been the forbidden fruit; hence the specific name of this species.

The *Banana* (*M. sapientum*) is similar to the Plantain, and is distinguished from it by having its stems marked with dark purple stripes and spots. The fruit is shorter, straighter, and rounder, the pulp softer, and of a more luscious taste. It is never eaten green, but when ripe is very agreeable, either eaten raw or fried in slices as fritters, and is esteemed by all classes in the West Indies. The fruit is four or five inches long, of the size and shape of a small cucumber, and they grow in bunches weighing twelve pounds and upwards. The negroes make a paste of them in the same way as of the Plantain, when they are about to set out on a journey, and this serves them both for food and drink. They take ripe Bananas, and when they have squeezed them through a fine sieve, form the solid fruit into small loaves, which are dried in the sun or in hot ashes, after being previously wrapped up in its own leaves. When they use this paste they dissolve it in water, and the liquor, thereby rendered thick, has an agreeable, acid taste, which makes it both refreshing and nourishing.

The fruit of the Plantain and the Banana contains a great deal of nutritious matter, as much as $29\frac{1}{2}$ per cent. having been obtained from the latter; and the produce of fruit of the former in hot climates is 72 tons per imperial acre. In South America, the fruit of the Plantain is not only used as an article of diet in its fresh state, but when dried forms an article of internal trade, besides having its flour separated and cooked, or made into biscuits. The meal has a fragrant odour, which it acquires in drying, and its flavour is said to depend a good deal on the rapidity with which the slices are dried. It is calculated, says Dr. Royle, that the fresh core of the fruit will yield forty per cent. of dry meal, and five pounds may be obtained from an average bunch of 25 lbs. weight; and an acre of Plantain walk of average quality, producing even during the year 450 such bunches, would yield upwards of a ton of meal. In the West Indies it is largely employed as the food of infants, children, and convalescents. The fruit is also preserved by drying. Colonel Colquhoun says, the fruit is gathered when perfectly ripe, and is laid on light cane frames exposed to the sun; when it begins to shrivel, the outer skin is stripped off; after this the drying is completed. During this process it becomes covered with a white, mealy

efflorescence of sugar, as the fig does under similar circumstances. For convenience of transport, it is pressed into masses of about 75 lbs. each, and is wrapped in plantain leaves. This has the flavour and consistence between the fig and the date, very sweet, and without any acidity. There are instances of them being in a perfect state of preservation after sixteen years, the sugar of the fruit being sufficient to preserve them. All parts of the Plantain and Banana abound in fibre; it is coarse and long in the outer layers of the sheathing footstalks, fine and silky in the interior, and of a middling quality in the intermediate layers. It is well adapted for cordage, and the natives of Dacca make the string of the bow with which they tease cotton with it, and in some of the islands of the Indian Ocean cloth is made from it. The plants of all the Musas attain perfection in about ten months from their first planting to the ripening of their fruit; and when the stalks are cut down, several suckers come up from the root, which in six or eight months produce fruit.

Musa Cavendishii is a dwarf-growing species not above six feet high, and produces excellently flavoured fruit. It is originally from China, and has been successfully cultivated by several of the best gardeners in this country for the sake of its fruit, of which a regular succession can be kept up. The fruit of *M. ensete*, a native of Abyssinia, is too bitter to be eatable; it is in colour and consistence like a rotten apricot; but the stem for several feet high is esculent before it becomes hard and fibrous; when boiled, it has the taste of the best new wheat bread not perfectly baked; the green is stripped from it till it becomes white, and Bruce says, "when soft, like a turnip well boiled, if eaten with milk or butter, it is the best of all food, wholesome, nourishing, and easily digested." *M. textilis* is the plant which yields *Manilla Hemp*, and is called *Abaca* in the Philippine islands. It abounds in the Philippines and neighbouring islands, even as far south as the Moluccas. The fibre produced by the outer layers is called *bandala*, and, being hard, strong, and coarse, is used for cordage; the inner layers yield a finer fibre, called *lupis*, employed in weaving *nipis* and other more delicate fabrics; while the intermediate layers are converted into what is called *tupoz*, of which are made web-cloths and gauzes, four yards long, of different degrees of fineness, and these are universally used as clothing, some being so fine that a garment may be enclosed in the hollow of the hand. The cordage made of the fibre is light, durable, and capable of bearing great strains, hence it has been employed for raising goods into warehouses, and out of mines; it is also used to a considerable extent for the rigging of ships, and when worn out can be converted into an excellent quality of paper. The fruit is green, hard, and of a disagreeable taste. The fruit of *M. troglodytarum*, furnishes food to the natives of the Moluccas, where the plant grows spontaneously. *Ravenala madagascariensis*, a native of Madagascar, and India, has fan-shaped leaves twelve feet long, and the base of their foot-stalk is accompanied by a sheath that contains fresh water, with which travellers quench their thirst, hence it is called by the French *Arbre des Voyageurs*; but this arises from the rains and not from the sap of the plant. The seeds are farinaceous, and, after being reduced to powder, are eaten with milk; they are covered with an aril or pellicle of a brown-blue colour, containing a fixed oil. The juice of the fruit is said to be used for dyeing. The root of *Heliconia psittacorum* is said to be eatable. The

roots of *H. bihai* are esteemed diuretic in the West Indies, and the leaves are used for covering boxes and thatching dwellings.

ORDER CCXXXVIII.—PANDANACEÆ—SCREW PINES.

THESE are trees, or shrubs, often branching, and sending down adventitious roots. The leaves are imbricated, linear-lanceolate, or pinnate, or fan-shaped and spiny. Flowers unisexual or polygamous, naked, or furnished with a few scales, spathaceous. Perianth wanting, or consisting of only a few scales. Stamens numerous, anthers two to four-celled. Ovaries one-celled, collected into parcels; stigmas sessile; ovules solitary or numerous. Fruit either one-seeded fibrous nuts, or many-seeded berries. Albumen fleshy; embryo minute, with a lateral slit.

TRIBE 1. Pandaneæ.—Leaves simple. Perianth wanting.

GENERA AND SYNONYMES.

Pandanus, <i>L. f.</i>	Pandanophyllum, [<i>Hsk.</i>]	Foullioya, <i>Gaud.</i>	Sussea, <i>Gaud.</i>
Arthrodaetylis, [<i>Forst.</i>]	Parrotia, <i>Gaud.</i>	Heterostigma <i>Gaud.</i>	Tuckeya, <i>Gaud.</i>
Keurva, <i>Forst.</i>	Bryantia, <i>Gaud.</i>	Hombrovia, <i>Gaud.</i>	Vinsonia, <i>Gaud.</i>
Marquartia, <i>Hassk.</i>	Dorystigma, <i>Gaud.</i>	Jeannerettia, <i>Gaud.</i>	Victoriperrea, [<i>Hornbr.</i>]
Hasskarlia, <i>Walp.</i>	Euduxia, <i>Gaud.</i>	Joinvillaea, <i>Gaud.</i>	Freyenettia, <i>Gaud.</i>
	Fisquetia, <i>Gaud.</i>	Roussinia, <i>Gaud.</i>	
		Soulegetia, <i>Gaud.</i>	

TRIBE 2. Cyclanthææ.—Leaves fan-shaped or pinnated. Flowers generally furnished with a perianth.

GENERA AND SYNONYMES.

Carludovica, <i>R. & P.</i>	Cyclanthus, <i>Poit.</i>	Nipa, <i>Th.</i>	Phytelephas, <i>R. & P.</i>
Ludovia, <i>Pers.</i>	Cyclosanthes, <i>Pöpp.</i>	Nypa, <i>Rumph.</i>	Elephantusia, <i>W.</i>
Salmia, <i>W.</i>	Wettinia, <i>Pöpp.</i>		

These are all natives of the tropics. The fruit of *Pandanus* are eatable; the albumen is amygdaloid; the juice of the leaves is moderately astringent, and is administered in diarrhœa and dysentery. The flowers of *P. odoratissimus* are fragrant; when young they are boiled with meat, and are regarded as aphrodisiac in India. For the sake of the flowers, the perfume of which is said to be far the richest and powerful, the plant is cultivated in Japan. The white base of the leaves is eaten in times of scarcity; the roots are used by the natives for corks. The leaves are long and tough, and are used for covering hats, making mats and cordage, and, in the Mauritius, for making bags for coffee, sugar, and grain. The natives of Polynesia suck the fruit for a sugary matter it contains; and, in Tongatabou, they make necklaces of the seeds. In Madagascar the fruit of *P. edulis* is eaten, and the terminal bud of *P. humilis* is used in the same way as that of the Palms. The unexpanded leaves of *Carludovica palmata* furnish the material of which *Panama hats* are made. The seeds of *Phytelephas macrocarpa* are what is known by the name of *Vegetable Ivory*.

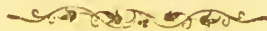
ORDER CCXXXIX.—TYPHACEÆ—REED-MACES.

AQUATIC, herbaceous plants, having stems without nodes, sword-shaped, rigid leaves, and unisexual, monœcious flowers, arranged on a loose, fleshy spike (spadix), without a spathe, or in sphaerical and spiny heads. Perianth composed of three or more scales, or a bundle of hairs. Stamens three to six, distinct or monadelphous; anthers wedge-shaped. Ovary single, superior, one-celled; ovule solitary, pendulous; style short; stigma simple, linear. Fruit dry, unopening, one-celled, and one-seeded, angular by compression. Seed solitary, pendulous, having an embryo in the centre of mealy albumen, and the radicle next the hilum.

GENERA AND SYNONYME.

Typha, L.
Sparganium, L.
Platanaria, Gray.

These are chiefly natives of northern hemispheres, and are rarely found between the tropics. Their leaves are used in some parts of Europe for making mats, winter coverings for plants, and for stuffing chairs. The powdered flowers of *Typha* have been used as an application to ulcers; and the pollen, like that of *Lycopodium*, is inflammable, and used as a substitute for it, as an application to excoriated surfaces; in Scinde, Western Australia, and New Zealand, it is mixed with water and formed into a kind of bread. The root-stocks contain a good deal of starch, and, in the East, are sometimes used as food; they are astringent and diuretic. The long leaves of *Sparganium erectum*, according to Poirer, were formerly used as swaddling-clothes for infants, instead of linen bandages. The plant is said to be astringent, and its roots sudorific.



ORDER CCXL.—ARACEÆ—ARUM FAMILY.

HERBACEOUS perennials, sometimes climbing and parasitical, throwing out aerial roots, frequently with a tuberous root-stock. *Leaves* radicle, or alternate on the stem, sheathing at the base, and generally with branching veins. *Flowers* arranged on a spadix, generally encompassed with a spathe, unisexual, monœcious, naked. *Stamens* definite or indefinite, hypogynous, very short; *anthers* two, four, or many-celled, ovate, turned outwards. *Ovary* superior, one-celled, very seldom three or more-celled, many-ovuled; *ovules* creet, or marginal, sessile, or attached to long cords, straight, curved, or inverted; *stigma* sessile. *Fruit* a berry. *Seeds* pulpy. *Embryo* in the axis of meally or fleshy albumen, straight, taper, with a cleft in one side, in which the plumule lies; *albumen* sometimes wanting.

TRIBE 1. *Cryptocoryneæ*.—Stamens distant from the numerous pistils, which are arranged in whorls round the base of the spadix, and form a many-celled ovary.

GENERA.

Cryptocoryne, Fisch.

Lagenandra, Daltz.

Stylochæton, Lepr.

TRIBE 2. *Dracunculeæ*.—Stamens and pistils numerous, separated by a mass of rudimentary processes; top of the spadix naked. Cells of the anthers larger than the connective.

GENERA AND SYNONYMS.

Arisarum, T.
Arisæma, Mart.
Biarum, Schott.
Homaid, Ad.
Ischarum, Bl.
Arum, L.
Gigarum, Cæsalp
Eminium, Bl.
Typhonium, Schott.

Stauromatum,
 [Schott.
Theriphonum, Bl
Dracunculus, T.
Pythonium, Schott.
Thomsonia, Wall
Amorphophallus Bl
Candarum, Rehb.
Pythion, Mart.

Fig. 225. Spathe of *Arum maculatum*.
 A, Spadix, with the flowers; B, cluster of fruits; C, section of a fruit, showing the seeds; D, section of a seed, showing the embryo.

TRIBE 3. *Caladieæ*.—Stamens and pistils numerous, either contiguous or separated by rudimentary processes. Top of the spadix generally naked. Cells of the anthers immersed in a very thick peltate connective.

GENERA AND SYNONYMES.

Remusatia, <i>Schott.</i>	Remusatia, <i>Wt.</i>	Acontias, <i>Schott.</i>	„ Calostigma, <i>Scht.</i>
Gonatanthus, <i>Kl.</i>	Peltandra, <i>Raf.</i>	Syngonium, <i>Schott.</i>	Meconostigma,
Colocasia, <i>Ray.</i>	Rensselaaria, <i>Bck</i>	Culeasia, <i>Palis.</i>	[<i>Schott.</i>
Caladium, <i>Vent.</i>	Leeontia, <i>Torr.</i>	Denhamia, <i>Schott</i>	Sphincterostigma
Ariopsis, <i>J. Grah.</i>	Xanthosoma, <i>Schott</i>	Philodendron, <i>Schtt</i>	[<i>Schott.</i>

TRIBE 4. *Anaporeæ*.—Stamens and pistils numerous, contiguous, and the rudimentary processes very often mixed with the pistils. Top of the spadix very rarely naked. Cells of the anthers immersed in a very thick, peltate connective.

GENERA AND SYNONYMES.

Spathicarpa, <i>Hook.</i>	„ Atherurus, <i>Bl.</i>	Aglaonema, <i>Schott.</i>	Homalonema <i>Schott</i>
Staurostigma <i>Schdt.</i>	Hemicarpurus,	Cyrtocladon, <i>Griff.</i>	Richardia, <i>Kunth.</i>
Dieffenbachia, <i>Scht.</i>	[<i>Nees.</i>		Zantedeschia, <i>Sp.</i>
Pinellia, <i>Tenore.</i>			

GEOGRAPHICAL DISTRIBUTION.—These are found in the greatest number in tropical climates, where they assume large dimensions and an arborescent growth, clambering up trees which they embrace with their aerial roots; in temperate regions they are rare, but in the basin of the Mediterranean and the warmer parts of North America they are more plentiful.

PROPERTIES AND USES.—The root-stocks contain a large quantity of starch, and a volatile acidity which is easily removed by drying; this acidity is more marked in the leaves and stalks than in the roots.

Arum maculatum, called in this country *Wake-Robin*, *Cuckoo-pint*, *Priest's-pint*, *Friar's-cowl*, and *Lords and Ladies*, is frequent in moist, shady places in woods, and by the sides of ditches. It is called "Lords and Ladies" from the spathe that surrounds the flower bearing a fanciful resemblance to the immense, old-fashioned, stiff ruffs in which lords and ladies of former days encompassed their heads. "Cuckoo-pint," and "Priest's-pint" have reference to the form of the spathe being like that of a drinking-cup or measure, in the former instance from the plant flowering in the spring when the cuckoo is heard, and the latter is a translation of the German *Pfaffen-pint*. I have not been able to ascertain the derivation of *Wake-Robin*. It was also called *Starch-wort*, on account of the roots being employed to stiffen ruffs and frills particularly in the time of Queen Elizabeth, when these ornaments were worn by gentlemen as well as ladies. Gerard says, "the most pure and white starch is made of the roots of cuckoo-pint; but most hurtfull for the hands of the laundresse that hath the handling of it, for it choppeth, blistereth, and maketh the hands rough and rugged, and withall smarting." The plant is acrid, caustic, and poisonous. The leaves are more active than the roots, and there are instances on record of children having died from eating them in a mistake for sorrel; bruised when fresh, and applied to the skin, they raise blisters, but when dried they are inactive from the evaporation of the acrid principle. The root, when fresh, is emetic; the juice turns turnsole paper red, and syrup of violets green, and is coagulated by acids, but the acrid principle it contains is so volatile that it is dissipated by drying or roasting, and then it is converted into a nutritious food of much value; but it is said if

the roots are taken up when the leaves are decayed, they will retain all, or nearly all, their acridity for a twelvemonth; and if gathered in the spring when the leaves are in full vigour, they rapidly dry, shrink, lose all their acridity, and become farinaceous. In the island of Portland, where the plant is so common, the roots are eaten by the inhabitants, or manufactured into a kind of arrow-root, or starch, and sold under the name of *Portland Sago*. The roots, according to Gilbert White, are scratched up and eaten by thrushes in severe snowy seasons, and the berries are devoured by several kinds of birds, particularly by pheasants; the former have been used as a substitute for soap and as a detergent. Bears are said to search after this plant as a medicine to open their stomachs, after they have lain for several weeks without food. Formerly the starch of the roots was converted into a cosmetic wash-powder, called by the French *poudre de chypre*, but the article now known under that name is composed of very different ingredients. Withering says—"it is undoubtedly a good and innocent cosmetic;" and it is still used in Italy to remove freckles from the face and hands. Bergius recommends the root to be gathered when the berries are ripe, and then a small piece applied to the tongue burns and pricks it most intolerably for several hours; but this may be removed by applying the bruised leaves of milfoil. *A. indicum*, called *Mankuchoo*, and *Man-guri*, in Brazil, is much cultivated about the huts of the natives, for its esculent stem and pendulous tubers. *A. cordifolium* has the singular property of disengaging heat during fecundation.

The roots of *Arisarum vulgare* are boiled and eaten in the South of Europe. *Arisæma* (*Arum*) *triphyllum* is a native of North and South America, and abundant in the United States, where it grows in moist, shady places, and is called *Indian Turnip*, and *Dragon-root*. All parts of the plant are highly acrid, and the roots are used officinally. When fresh, they are employed as a powerful local irritant, stimulating the secretions, particularly those of the skin and lungs; and have therefore been found advantageous in asthma, hooping-cough, chronic catarrh, and chronic rheumatism. When taken from the ground it is too acrid for use, and is therefore kept awhile till part of the acridity passes off. Boiled in milk, when dry, it communicates to it a slight acridity, which is useful in consumption, if drunk for a length of time; if the milk is thickened with it to the consistence of an ointment, it serves to cure scalled head, ringworm, &c. It is stated that this *Arum* never acts on the general circulation, but only on the glandular system, which it actively stimulates, and increases the secretions. *Dracunculus vulgaris*, or *Green Dragon*, is a native of the South of Europe, and receives its name from spots on the stem. Its flowers are black, and remarkably foetid, giving out exhalations that produce headache, dizziness, and vomiting. The root is emetic, and has been recommended in bites of venomous serpents. *Amorphophallus orizensis* has an exceedingly acrid root, which, when fresh, is applied by the natives of India, in cataplasm, to excite tumours, for which Roxburgh considers it a powerful stimulant. *A. campanulatus* is extensively cultivated in the northern Circars for its roots, which are highly nutritious. The roots of *Colocasia mucrorhizon*, a native of the Moluccas and the South Sea Islands, are very large, and, when washed to deprive them of their acrid principle, are eaten in Tahiti, where the plant is called *Tara*, or *Kopeh*. In India, a

liniment is made with these roots and gingilie oil, and used by the native practitioners for frictions to cure intermittent fevers. *C. esculenta*, or *Egyptian Ginger*, grows in Spain, Portugal, Sardinia, and particularly in Egypt, where it has been cultivated from time immemorial, for its roots, which serve as an article of food. They contain an immense quantity of fecula, and are eaten by the inhabitants of Egypt and some parts of India in potages, forming the principal food of the inhabitants; their flavour is like that of potatoes. The roots of *C. himalensis* forms the principal part of the food of the hill people of the Himalayas. *Caladium arborescens* is a shrub, a native of Brazil, and is possessed of great acridity. Its root is very large, and yields a great quantity of starch; its leaves are made into resolute cataplasms; and a decoction of the plant in urine is used as a fomentation against pains in the joints, and inflammation of the kidneys. The seeds are eaten by the natives of Guiana, who call them *moucou-moucou*. The fresh juice is caustic, and is put on the lips of negroes as a punishment for misbehaviour. The pulverised root, in doses of five or six grains, is drastic. The roots of *C. bicolor* and *C. esculentum* are nutritious, and furnish an abundance of food. The latter species has very large roots, destitute of any acridity, and furnish a large quantity of fecula; the flowers have such a cadaverous smell, that flies actually deposit their eggs in them, taking them for a dead carcase; its leaves are eaten, when cooked, as a vegetable, as are those of *Xanthosoma sagittifolia*, under the name of *Chou caraïbe*. The most remarkable and dangerous of the whole family is *Dieffenbachia seguina*, or *Dumb Cane*, a native of the West Indies. It grows to the height of five or six feet, resembling a small banana; its juice is so caustic that two drachms would cause death, by producing inflammation of the stomach, and it forms indelible marks on linen. When chewed, it swells the tongue, and destroys the power of speech for some time. *Richardia (Calla) æthiopica* has long been a favourite window-plant, for its beautiful, white, porcelain-like spathe, and its golden spadix. It is a native of the Cape of Good Hope, where the porcupines eat the roots; but they are so acrid that, applied to the human skin, they cause blisters. The roots of *Homalomena aromatica*, when cut, exhale an aromatic scent of ginger, and are esteemed in India as an excellent stimulant.

ORDER CCXLI.—ACORACEÆ—SWEET FLAGS.

THESE differ from the preceding in having the flowers hermaphrodite, and, except in the first tribe, furnished with a regular perianth.

TRIBE 1. Calleæ.—Perianth wanting. Ovules erect.

GENERA AND SYNONYME.

Calla, L.	Monstera, Adans.	Scindapsus, Schott.
Schismatoglottis, Zoll.	Heteropsis, Kunth.	Rhaphidophora, Hassk.

TRIBE 2. *Orontieæ*.—Flowers with a regular scaly perianth. Leaves plane, entire, palmated or pinnated; ovules pendulous.

GENERA AND SYNONYMES.

Pothos, <i>L.</i>	Goniurus, <i>Presl.</i>	Spathiphyllum,	Ictodes, <i>Bigel.</i>
Lasia, <i>Lour.</i>	Hydnostachyon,	[<i>Schott.</i>	Spathyema, <i>Raf.</i>
Cryptosperma <i>Griff</i>	[<i>Liebm.</i>	Dracontium, <i>L.</i>	Orontium, <i>L.</i>
Rhodospatha, <i>Pöpp</i>	Anthurium, <i>Schott.</i>	Symplocarpus, <i>Sal.</i>	

TRIBE 3. *Acoreæ*.—Flowers with a regular scaly perianth. Leaves sword-shaped, with an amplectant vernation. Ovules pendulous.

GENERA.

Gymnostachys, *R. Br.*

Acorus, *L.*

Most of these are found in the tropics, inhabiting shady places; but some are also found in colder latitudes, and extend even as far as Lapland. The same acrid principle prevails in them as in *Araceæ*, and their roots yield in the same manner large quantities of amylaceous matter. *Calla palustris* possesses this acidity in a very marked degree in its root-stocks, but it is easily got rid of by grinding and then boiling them; after which the Laplanders make the fecula into bread, like other farinaceous substances. In their fresh state they are used as vesicants; and, when the mountains are covered with snow, the bears hunt for and eat them as food. The leaves of *Monstera pertusa* are used in Demerara as vesicants, and as a cure for anasarea, by covering the whole body with the leaves. The root is acrid, the juice caustic, and is employed to neutralise the poison of serpents, by pouring it on the wounds made by these reptiles. The fruit of *Scindapsus officinalis*, cut in thin slices, is the *gui-pippul* of the Indian bazaars, and is highly esteemed as a stimulant tonic. *Pothos scandens* is recommended in India as a remedy for putrid fevers. *P. cannaeformis*, a native of Cunana, has the delicious odour of vanilla, and is on that account called vanilla by the natives; they smoke it with their tobacco to give it an aroma. *Dracontium polyphyllum*, a native of India and Japan, is acrid and purgative; its root is employed in these countries to produce abortion, and it is there regarded as a powerful emmenagogue. It is used as a powerful drastic in dropsies, and regarded as soothing in asthma; but after being deprived of a portion of its acidity, it is employed as an antispasmodic, and as an Indian remedy against hemorrhoids. *Symplocarpus* (*Dracontium*) *fœtidus*, called by the Americans *Skunk Cabbage*, grows abundantly throughout the whole of the northern and middle states. The whole plant emits a most disagreeable odour, which resides in a volatile principle, diminished by drying and dissipated by heat. The root, which is the part used, is stimulant, antispasmodic, and narcotic; in large doses it causes nausea and vomiting, with headache, vertigo, and dimness of vision; but dried and pulverised it has succeeded perfectly in many cases of asthma, in doses of thirty or forty grains, and it has also been employed with advantage in chronic catarrh, chronic rheumatism, and hysteria. The *Sweet Flag*, or *Sweet Myrtle-grass* (*Acorus calamus*), grows abundantly in some parts of

Britain in watery places. The whole plant is aromatic, but the root-stocks alone preserve the aroma on being dried. These are used in medicine as a stimulant tonic, in cases of pain in the stomach or bowels, arising from flatulence, or in cases of torpor or debility of the alimentary canal. They are aerid, slightly bitter, with an agreeable aromatic odour, and consist of 0·1 of volatile oil; 2·3 of soft resin; 3·3 of extractive, with a little chloride of potassium; 5·5 of gum, with some phosphate of potassa; 1·6 of starch, analogous to inulin; 21·5 of lignin; and 65·7 of water. These roots are employed in the preparation of medicated malt liquours, called herb ales; reduced to powder, they are extensively used by perfumers for making hair-powder, and by the French for giving flavour to their snuff, called "à la violette." At Constantinople the fresh root is made into a confection, and eaten as a stomachic during the prevalence of epidemic diseases; in Siberia it is used against coughs of humid catarrh. The whole plant has been used for tanning leather; and in Poland it is strewed on the floors of the upper and middle classes of society, when they are about to receive company, in order that the leaves may be bruised by the feet of the guests, and fill the rooms with an agreeable odour.

ORDER CCXLII.—LEMNACEÆ.—DUCKWEEDS.

THESE are chiefly floating plants, with their roots arising from the bottom of a flat frond, and hanging loose in the water. The flowers are produced from the margin of the frond, bursting through a membranous spathe, monœcious, and naked; the males with one or two stamens; the females with a one-celled ovary, one or more erect ovules, a short style, and a simple stigma. Fruit unopening, membranous, or capsular, one or more seeded. Seeds with the embryo in the axis of fleshy albumen, with a cleft either lateral or at the apex of the nucleus.

GENERA AND SYNONYMES.

Wolffia, <i>Hork.</i>	Grantia, <i>Griff.</i>	Apiospermum <i>Klotz</i>	Zala, <i>Lour.</i>
Horkelia, <i>Richb.</i>	Telmatophace, <i>Schl</i>	Limnonesis, <i>Klotz.</i>	Ambrosinia, <i>L.</i>
Lemna, <i>Schleid.</i>	Spirodela, <i>Schl.</i>	Pistia, <i>L.</i>	Ucria, <i>Targ.on.</i>
Wolffia, <i>Endl.</i>			

These are distributed throughout the whole world; Lemna in the temperate parts, Ambrosine in the warmer, and Pistia in the tropics. *Pistia stratiotes* is a small aquatic plant, forming with its leaves rosettes, that float on the surface of the water in the West Indies, Africa, and India, where it is said to absorb the deleterious gases of the muddy marshes where it grows; and it is perhaps on this account that it is held sacred on the west coast of Africa, the priests consecrating it in vases filled with water, in which it is left to grow. A decoction of the plant is considered demulcent and refrigerant, and is prescribed in dysuria, and other diseases of the urinary passages. In India the leaves are applied to hemorrhoids.

The plant is said to be so acrid, that in Jamaica the water taken from tanks where it grows is so impregnated with the acidity that it causes bloody flux. The *Duckweeds* (*Lemna*) are abundant in all ponds and stagnant waters, covering the surface with a thick crust of green.

ORDER CCXLIII.—NAIADACEÆ—NAIADS.

FRESH or salt water plants, with cellular leaves and stems, and sheathing stipules. The flowers are inconspicuous, and sometimes hermaphrodite, but generally monœcious. Perianth of one to four scaly pieces, or wanting. Stamens definite, hypogynous. Ovary solitary, of one to four one-celled carpels, each containing one erect or pendulous ovule, rarely three and erect. Style simple, erect. Fruit unopening, dry, one-celled, and usually one-seeded. Seeds without albumen; embryo straight or curved, with a lateral cleft.

GENERA AND SYNONYMS.

Caulinia, <i>W.</i>	Graumüllera,	Kernera, <i>W.</i>	Cathantes, <i>Rich.</i>
Ittnera, <i>Gmel.</i>	[<i>Rehb.</i>	Phyllospadix, <i>Hook.</i>	Halodulo, <i>Endl.</i>
Najas, <i>W.</i>	Thalassia, <i>Sol.</i>	Zannichellia, <i>Michel</i>	Diplanthera, <i>Thou</i>
Fluvialis, <i>Michel.</i>	Zostera, <i>L.</i>	Likea, <i>H. B. K.</i>	Althenia, <i>Petit.</i>
Cymodocea, <i>König.</i>	Posidonia, <i>König.</i>	Heterostylus, <i>Hook</i>	Bellevia, <i>Delil.</i>
Amphibolis, <i>Agh.</i>	Caulinia, <i>DC.</i>	Tetroncium, <i>W.</i>	

They are mostly natives of tropical and extra-tropical regions, but some are found in temperate and cold climates. They are not known to possess any properties, or to be applicable to any uses, with the exception of *Zostera marina* or *Sea-wrack*, which is thrown up on the sea-shore in such abundance that mounds are made with it to enclose the encroachments of the sea. It is also used as thatch, and is said endure for upwards of a century; by exposure it bleaches white. In Sweden and Holland it is used as a manure, and is preferred to hay for stuffing beds. The rush-like coverings of Italian liquor-flasks are made of this plant. Roasted and reduced to powder, it is recommended against scrophula and other diseases of the lymphatic system; and it is burned to obtain soda. It is used as a manure, cattle eat it as forage, and it has been employed in the manufacture of paper.

ORDER CCXLIV.—TRIURIDACEÆ—TRIURIS FAMILY.

THESE are nearly allied to the preceding order, but are distinguished from it partly by their peculiar seed, which consists of a hard, striated integument, containing an embryo in the form of a many-celled nucleus.

GENERA AND SYNONYMES.

Triuris, <i>Miers.</i>	„ Peltophyllum,	Soridium, <i>Miers.</i>	Aphyllcia <i>Champ</i>
Hexuris, <i>Miers.</i>	[<i>Gardn.</i>	Sciaphila, <i>Bl.</i>	Hyalisma, <i>Champ.</i>

They are all natives of the tropics of South America, Java, Ceylon, and the Philippines, where they grow in shady places, deriving their nourishment from the roots of trees.

ORDER CCXLV.—ERIOCAULONACEÆ—PIPEWORTS.

MARSH perennials, having linear, cellular leaves, sheathing at the base. Flowers unisexual. Glumes two, unilateral, or three. Stamens one to three; anthers one-celled. Ovary superior, two or three-celled, surrounded by a membranous tube with two or three teeth or lobes. Fruit a capsule, opening through the cells. Seeds solitary, pendulous, covered with wings or rows of hair. Embryo more or less lens-shaped, lying on the albumen at the end of the seed most remote from the hilum.

GENERA AND SYNONYMES.

Lachnocaulon <i>Knth</i>	Randalia, <i>Petiv.</i>	Tonina, <i>Aubl.</i>	Stephanophyllum,
Eriocaulon, <i>L.</i>	Sphærochloa <i>Pal</i>	Hyphydra, <i>Schröb</i>	[<i>Guill.</i>
Eupatya, <i>Fl. Fl.</i>	Leucocephala, <i>Roxb</i>	Philodice, <i>Mart.</i>	Symphachne, <i>Palis</i>
Nasmythia, <i>Iluds</i>	Pæpalanthus, <i>Mart</i>	Cladocaulon, <i>Gardn</i>	

Chiefly natives of the tropics of America and Australia. Some are found in North America, and one in Scotland. Endlicher states that *Eriocaulon setaceum*, boiled in ale, is a popular remedy in India against the itch.

ORDER CCXLVI.—RESTIACEÆ—ROPE-GRASSES.

HERBS or undershrubs, with simple, narrow leaves, which are sometimes wanting. Flowers generally unisexual, arranged in braeteate heads or spikes. Glumes two to six, seldom wanting. Stamens two to three; anthers usually one-celled. Ovary one or more celled; ovules one in each cell, pendulous. Fruit a capsule or nut. Seeds inverted, having a lens-shaped embryo on the outside of the albumen.

GENERA AND SYNONYMES.

Leptocarpus, <i>R.Br.</i>	Loxocarya, <i>R. Br.</i>	Hypokena, <i>R. Br.</i>	Dovea, <i>Kunth.</i>
Rhodocoma, <i>Nees.</i>	Chaetanthus, <i>R. Br.</i>	Cucullifera, <i>Nees.</i>	Willdenowia, <i>Th.</i>

Nematanthus, [Nees.	Lepidanthus, <i>Nees.</i>	Staberoha, <i>Kunth.</i>	Restio, <i>L.</i>
Hypodiscus, <i>Nees.</i>	Anarthria, <i>R. Br.</i>	Elegia, <i>Th.</i>	Calorophus, <i>Lab.</i>
Leucoplocus, <i>Nees.</i>	Lyginia, <i>R. Br.</i>	Chondropetalum, [Rottb.	Calopsis, <i>Pal's.</i>
Mesanthus, <i>Nees.</i>	Lepyrodia, <i>R. Br.</i>	Desmoeladus, <i>Nees.</i>	Cannomois, <i>Palis.</i>
Anthochortus, <i>Nees.</i>	Thamnohortus, [Berg.	Lepidobolus, <i>Nees.</i>	Bœckhia, <i>Kunth.</i>
Ceratocaryum, <i>Nees</i>			

Natives of South America, Australia, and southern Africa, in woods and marshy places. The houses at the Cape of Good Hope are commonly thatched with *Restio tectorum*, both in town and country, and sometimes whole huts are built with it. A roof thatched with it will last twenty or thirty years, and would last much longer if the wind did not blow dirt into it, which causes it to rot. *Willdenowia teres* is employed for making baskets and brooms.

ORDER CCXLVII.—DEVAUXIACEÆ—BRISTLEWORTS.

SMALL herbs, having the appearance of small Scirpi, with simple, naked, thread-like stems, and bristle-like leaves, sheathing at the base. Flowers in distichous spikes, included in a terminal spathe. They are distinguished from the Restiaceæ principally in having separate ovaries, attached to a common axis, and fruit consisting of utricles, opening longitudinally.

GENERA AND SYNONYME.

Aphelia, *R. Br.*
Alepyrum, *Labill.*
Centrolepis, *R. Br.*

Desvauxia, *R. Br.*
Gaimardia, *Gaud.*

They are natives of Australia, both within and beyond the tropics. They are not known to possess any properties.



ORDER CCXLVIII.—CYPERACEÆ—SEDGES.

HERBACEOUS perennials, having a grass-like habit, and growing in humid places and on the borders of water. The *stem* is either cylindrical or triangular, and without partitions at the nodes. The *leaves* are either distichous or tristichous, sheathing, and the sheath is never slit. *Flowers* either hermaphrodite or unisexual, arranged in small spikes, panicles, or heads, or scaly spikelets, composed of a variable number of flowers; each flower is composed of one scale, or bract, called a *glume*, in the axil of which are two or three stamens in the males, and a pistil in the females. *Stamens* hypogynous, generally three, very rarely four, nine, or twelve; *anthers* fixed by their base, two-celled, bursting longitudinally. *Ovary* sessile or stipitate, free, one-celled, often surrounded with silky hairs, or by bristles called *setæ*, or girded by a three-lobed disk at the base; *ovule* solitary, erect, inverted; *style* simple, three-cleft or two-cleft. *Fruit* a round, compressed, crustaceous, or bony nut, rarely somewhat fleshy, either triangular and naked or enveloped in the utricule, which completely covers it. *Embryo* small, enclosed within the base of fleshy or mealy albumen; the radicular extremity inferior.

TRIBE 1. *Cyperæ*.—Spikes many-flowered, composed of scales, the lower ones usually empty, arranged in two rows. Flowers hermaphrodite, without any perianth; style deciduous, equal. Fruit never beaked.

GENERA AND SYNONYMES.

Dulichium, Rich.
Pleuranthus, Rich.
Comostemum, Nees.
Dielidium, Sch'r.
Cyperus, L.
Torreya, Raf.
Galilea, Parl.
Papyrus, W.
Kyllingia, L.

Hydroschœnus, Zoll.
Mariscus, Vahl.
Adulpa, Bose.
Courtoisia, Nees.
Opetiola, Gert.
Tryocephalon, Forst.
Abilgaardia, Vahl.
Trin, Rich
Leptoschœnus, Nees.



Fig. 226. *Carex stricta*.
 A, A flower of *Scirpus palustris*; B, female flower of *Carex hirta*; C, section of ditto.

TRIBE 2. *Scirpæ*.—Spikes generally many-flowered; scales overlapping each other all round, rarely in two rows, equal, a few of the lower ones often empty. Flowers hermaphrodite; perianth wanting, or rudimentary; *setæ* or hairs, six, rarely more but never fewer, sometimes instead there are three scales intercepted by as many bristles. Fruit usually beaked at the summit by the persistent base of the style

GENERA AND SYNONYMS.

Eriophorum, <i>L.</i>	Eleocharis, <i>R. Br.</i>	Malacochaete, <i>Nees</i>	Nemum, <i>Palis.</i>
Linagrostis, <i>Lam.</i>	Eleogenus, <i>Nees.</i>	Hymenochaete, <i>Nees.</i>	Trichelostylis, <i>Lest.</i>
Trichophorum, <i>[Pers.]</i>	Chaetocyperus, <i>[Nees.]</i>	Elytrospermum, <i>[C. A. M.]</i>	Dichostylis, <i>Palis</i>
Androcoma, <i>Nees.</i>	Scirpidium, <i>Nees.</i>	Scirpus, <i>L.</i>	Isolepis, <i>R. Br.</i>
Androtrichum, <i>[Brongn.]</i>	Bæothryon, <i>Nees.</i>	Helothis, <i>Nees.</i>	Ascolepis, <i>Nees.</i>
	Pterolepis, <i>Schrad.</i>		Holoschænus, <i>Lk.</i>
			Eleogiton, <i>Lk.</i>

TRIBE 3. *Fuireneæ*.—Flowers hermaphrodite; scales regularly overlapping each other all round, each covering a naked flower. Perianth chiefly double, of three ovate, scale-like sepals on claws, alternating with three small bristles. Fruit crustaceous or cartilaginous, three-sided.

GENERA AND SYNONYMS.

Fimbristylis, <i>Vahl.</i>	Oncostylis, <i>Mart.</i>	Fuirena, <i>Rottb.</i>	Hemichlæna, <i>Schrd.</i>
Trichelostylis, <i>[Lest.]</i>	Blepharolepis, <i>Nees.</i>	Vaginarina, <i>L. C. R.</i>	Anosporum, <i>Nees.</i>
Dichelostylis, <i>[Palis.]</i>	Oxycaium, <i>Nees.</i>	Pleurachne, <i>Schrd.</i>	Sickmannia, <i>Nees.</i>
Echinolytrum, <i>[Desv.]</i>	Ficinia, <i>Schrd.</i>	Aerolepis, <i>Schrd.</i>	Melanocranis, <i>Vahl.</i>
	Schœnidium, <i>Nees</i>	Hypophialium, <i>[Nees.]</i>	Hypolepis, <i>Pal.</i>
	Vauthiera, <i>A. Rich.</i>		

TRIBE 4. *Hypolytreæ*.—Spikes many-flowered; scales overlapping each other all round, a few of the lower ones empty. Flowers hermaphrodite, each enclosed by from one to six proper, smaller, thinner, scales; perianth wanting. Fruit beaked at the summit by the persistent base of the style.

GENERA AND SYNONYMS.

Diplasia, <i>Rich.</i>	Albikia, <i>Prest.</i>	Lipocarpa, <i>Nees.</i>	Hypelytrum, <i>Lk.</i>
Hypolytrum, <i>Rich.</i>	Platylepis, <i>Kunth</i>	Hypœlyptum, <i>R. Br.</i>	Hemicarpa, <i>Nees.</i>
Beesa, <i>Palis.</i>			

TRIBE 5. *Chrysitricheæ*.—Flowers androgynous, one-fruited. Perianth proper; disk wanting. Fruit crustaceous, globular, rugged at the apex.

GENERA AND SYNONYMS.

Chorizandra, <i>R. Br.</i>	Pandanophyllum, <i>Hassk.</i>
Lepironia, <i>Rich.</i>	Chrysithrix, <i>L. f.</i>
Chondrachne, <i>R. Br.</i>	

TRIBE 6. *Cladiææ*.—Spikes generally few-flowered, with scales either in two rows or overlapping each other all round. Flowers generally polygamous, sometimes hermaphrodite. Perianth six to ten setæ, or bristles, sometimes wanting. Stamens two or three, seldom six. Fruit without a beak; style deciduous.

GENERA AND SYNONYMS.

Evandra, <i>R. Br.</i>	Lamprocarya, <i>R. Br.</i>	Didymonema, <i>Prd.</i>
Caustis, <i>R. Br.</i>	Morelotia, <i>Gaud.</i>	Epiandria, <i>Prest.</i>
Gahnia, <i>Forst.</i>	Melachne, <i>Schrd.</i>	Cladium, <i>P. Br.</i>

TRIBE 7. *Rhynchosporæ*.—Spikes generally few-flowered. Scales in two rows or overlapping each other all round, the lower ones empty. Flowers generally polygamous. Perianth wanting, or composed of six, rarely eight or ten, seldom more or less valves. Stamens three, seldom six. Fruit beaked by the persistent base of the style.

GENERA AND SYNONYMES.

Remirea, <i>Aubl.</i>	Echinoschœnus,	Buekia, <i>Nees.</i>	Rhynchospora, <i>Vahl.</i>
Miegia, <i>Schreb.</i>	[<i>Nees.</i>	Machœrina, <i>Vahl.</i>	Eriospora, <i>Hochst.</i>
Isochœnus, <i>Nees.</i>	Haloschœnus,	Tricostularia, <i>Nees.</i>	Psilocarya, <i>Torr.</i>
Gymnoschœnus,	[<i>Nees.</i>	Nemochloa, <i>Nees.</i>	Mesomachena, <i>Nees.</i>
Schœnus, <i>L.</i>	Dichromena, <i>Rich.</i>	Nomochloa, <i>Pal.</i>	Diplochæte, <i>Nees.</i>
Torulinum, <i>Dsr.</i>	Ptilochæta, <i>Nees.</i>	Pleurostachys,	Ephippiorhynchi-
?Schœnopsis,	Astroschœnus, <i>Nees</i>	[<i>Brongn.</i>	[<i>um, Nees.</i>
[<i>Lestib.</i>	Spermodon, <i>Palis.</i>	Trianoptiles, <i>Fenzl.</i>	Cephaloschœnus,
Gussonea, <i>Presl.</i>	Triodon, <i>Rich.</i>	Ecklonia, <i>St.</i>	[<i>Nees.</i>
Chapelliera, <i>Nees.</i>	Oreobolus, <i>R. Br.</i>	Cyathocoma, <i>Nees.</i>	Calyptrorhynchi,
Baumea, <i>Gaud.</i>	Lepidosperma, <i>Lab.</i>	Ideleria, <i>Kuth.</i>	Pterotheca, <i>Presl.</i>
Elynanthus, <i>Pal.</i>	Lepidosperma,	Chætophora, <i>R. Br.</i>	Haplostylis, <i>Nees.</i>
Vincentia, <i>Gaud.</i>	[<i>Röm. & Sch.</i>	Carpha, <i>B. & S.</i>	Mitrospora, <i>Nees.</i>
Zosterospermum,	Schlerochætium,	Streblidia, <i>Lk.</i>	Morisia, <i>Nees.</i>
[<i>Pal.</i>	[<i>Nees.</i>	Asterochæte, <i>Nees.</i>	

TRIBE 8. *Sclerieæ*.—Spikes monœcious, the fertile spikes one-flowered, the sterile several-flowered. Perianth wanting. Stamens generally three, rarely two or one. Style trifid, equal at the base. Fruit stony or crustaceous, often propped by a three-lobed disk, or a flat, bipartite one, globular.

GENERA AND SYNONYME.

Aulacorhynchus,	Hymenolytrum,	Acrocarpus, <i>Nees.</i>	Pteroscleria, <i>Nees.</i>
[<i>Nees.</i>	[<i>Schr.</i>	Mastigoscleria, <i>Nees</i>	Scleria, <i>Berg.</i>
Anogyna, <i>Nees.</i>	Trachyloma, <i>Nees.</i>	Osmoscleria, <i>Nees.</i>	Cylindropus, <i>Nees</i>
Hypoporum, <i>Nees,</i>	Chondrolomia, <i>Nees</i>	Macrolomia, <i>Nees.</i>	Diploscyphus, <i>Lich.</i>
Calyptracarya, <i>Nees</i>	Lagenocarpus, <i>Nees</i>	Ophryoscleria, <i>Nees</i>	Ptychocarya, <i>R. Br.</i>
Bequerela, <i>Brongn.</i>	Cryptanguina, <i>Schr.</i>	Schizolepis, <i>Schr.</i>	Diplacrum, <i>R. Br.</i>
	Cephalocarpus <i>Nees</i>		

TRIBE 9. *Elyneæ*.—Spikes monœcious or dioecious. Perianth wanting, or composed of many bristles, with soft, smooth, silky hairs. Fruit three-sided, beaked by the persistent base of the style.

GENERA AND SYNONYMES.

Kobresia, <i>W.</i>	Fröhlichia, <i>Wulf.</i>	„ Dilepis, <i>Endl.</i>
Elyna, <i>Schrad.</i>	Trilepis, <i>Nees.</i>	„ Fintelmannia, <i>Kuth.</i>

TRIBE 10. *Cariceæ*.—Flowers monœcious in the same or separate spikes, sometimes dioecious; male spikes simple, female spikes more or less compound. Scales overlapping each other all round. Perianth wanting. Style usually solitary. Fruit enclosed in a sac composed of two united inner scales, lens-shaped, or triangular.

GENERA AND SYNONYMES.

Schœnoxyphium, <i>Nees.</i>	Carex, <i>Mieh.</i>	„ Scuria, <i>Raf.</i>
Hoppia, <i>Nees.</i>	Vignea, <i>Pal.</i>	„ Triodia, <i>Raf.</i>
Uncinia, <i>Pers.</i>	Schelhammeria, <i>Mön.</i>	„ Trassus, <i>Gray.</i>

UNCERTAIN OR DOUBTFUL GENERA.

Mapania, *Aubl.*
 Diaphora, *Lour.*
 Haplostemum, *Raf.*

Diplarrhinus, *Raf.*
 Distichmus, *Raf.*

Tetraria, *Pal.*
 Catagyna, *Pal.*

GEOGRAPHICAL DISTRIBUTION.—This family is diffused over the length and breadth of the whole world, and there is no part of it from which they are excluded. In the arctic regions they are more numerous than grasses; and as we advance towards the equator the Scirpi and Carices gradually become less frequent, and give place to the grasses; but between the tropics the species of *Cyperus* gain the ascendancy, and abound on the banks of rivers and in humid, shady places in the primæval forests.

PROPERTIES AND USES.—They are not rich in resources; some roots abound in fecula, and others are slightly sudorific and aromatic. None of the seeds are eatable; their foliage is hard, dry, and of such a nature that cattle do not eat it. Notwithstanding their close affinity to the grasses, there is so great a difference between the two families, that whereas the latter are the great sources of animal food, the sedges are almost utterly useless.

The celebrated *Egyptian Papyrus* (*Papyrus antiquorum*), or *Egyptian Reed*, from which the ancient Egyptians made their paper, still grows in the marshes of Egypt, or in stagnant waters of the Nile. It is also found in Sicily, Syria, and Nubia, and extends even to Senegal. This plant rises, with a triangular stem, to the height of eight or ten feet, and surmounted with a large compound umbel of flowers, having long filiform involucre, the lower part clothed with long, hollow, sword-shaped leaves, of a brown colour. The root-stocks are long and tortuous, four or five inches thick; when young they are sweet and nutritious, and are eaten by the inhabitants; they also yield a fecula, which, with the base of the stems roasted, they use as food, and they suck their juice in the same way as they do that of the sugar-cane. When old, the root-stock becomes hard and woody, and was converted into cups, moulds, and other utensils; one use of it was to make covers for binding the leaves of the books, which were made of the stem. The whole plant is used for making boats, in Abyssinia, a piece of the acacia tree being put in the bottom to serve as a keel. The leaves and the stem have been twisted into ropes, and with the vertical fibres cloth is made. The ancients made their paper from the pellicle found between the pith and bark of the thick part of the stalk, and the plant being called *babeer*, in Syria, this word furnished the appellation papyrus, from which our word paper is derived. The pellicles were peeled from the stems, and cut into strips of equal length; the strips were placed side by side on a board, in sufficient number to form a sheet; other strips were placed side by side in an opposite direction over them, so as to make the sheet sufficiently thick and strong; each sheet was pressed, dried in the sun, and polished with a shell or some other substance, and twenty sheets or upwards were glued together to form a roll. The breadth of any roll depended on the length of the strips, and was usually from ten to thirteen fingers broad, and the length depended on the number of the sheets. With the rays of the umbels of the flowers, the Egyptians made chaplets for the heads of their gods. Under the arm of a great many of the mummies, a small bunch of papyrus is found. It was, doubtless, of this plant that Pharaoh's daughter made the

“ark of bulrushes” in which she hid the infant Moses. The *Indian Matting*, brought from Calcutta, is made from *P. pangorei*, called *Madoorkati*, in Bengal, where it grows abundantly. Roxburgh states that the stalks of the plant, when green, are split into three or four pieces, which in drying contract so much as to bring the margins in contact, in which state they are woven into mats, and thus show a nearly similar surface on both sides.

The *Rush-Nut* (*Cyperus esculentus*) is a native of India, and grows also in Egypt and the East. The root-stocks are composed of thin fibres, to the extremity of which are attached round or oblong bulbs, about the size of a filbert, brown without, and white within; farinaceous, having a camphorous odour, a sweet, agreeable, rather saccharine taste, and mucilaginous. These bulbs, on analysis, afford starch, fixed oil, sugar, albumen, gum, salts of malic and tannic acid, and oxide of iron. The dry root contains one-sixth its weight of oil, of a beautiful golden colour, nut-like smell, and slightly camphorous taste. It deposits stearine by standing, and in general appearance resembles the other fixed oils. The bulbs are eaten to a great extent in Manilla. In Egypt they are called by their Arabic name, *Hableziss*. When boiled they are nutritious, and have the taste of chesnuts; when roasted they have been used as a substitute for coffee, and yield a preparation resembling chocolate; the Egyptians express from them a milky juice, which they consider pectoral and emollient; and give them to nurses, in order to increase the quantity of their milk; in Spain they are used for emulsions. *C. longus* is a native of Europe, and in a few places in England. The root-stocks have an agreeable odour like violets, and a bitter, balsamic pungent, and slightly astringent taste. The bitter principle that is mixed with the aroma and the fecula of this root, prevents it being eatable. It is employed as a sudorific and emmenagogue, and to aid difficult accouchements; its slightly tonic action recommends it as a stomachic, and a promoter of digestion. An aromatic principle, and a very small quantity of volatile oil are obtained by distillation with water. It is employed by perfumers. *C. rotundus* grows in India, Egypt, and the south of France, and its tubers are similar to those of *C. longus*, but redder towards the centre, and more bitter; their odour is more resinous and camphorous. The properties are the same as those of the preceding. In India, where it is called *Mootha*, they are regarded as an excellent stomachic, and are given in cholera, irritation of the bowels, and inflammation of the digestive organs. The tubers of *C. geminatus* are eaten in India, and have the taste of sago; those of *C. pertenuis*, called *Nagur-mootha*, are employed as a diuretic and diaphoretic, in India, and when dried and pulverized, are used by Indian ladies for scouring and perfuming their hair. *C. textilis* is used in India for making mats. The tubers of *C. bulbosus*, when roasted and boiled, have the taste of potatoes, and were it not for their small size, would become a valuable article of food. Hamilton says, *C. hydra* is the pest of the planters in the sugar plantations of the West Indies, and that when the plant has once got a footing, it renders a whole plantation perfectly sterile. *Kyllingia triceps* is employed in India in diabetes and as a stomachic.

Eriophorum angustifolium, or *Cotton Grass*, is not an uncommon plant in Britain, growing in marshes and bogs. With the down the highlanders stuff pillows and make wicks of candles. *E. vaginatum*, another and more

common British species, also produces a large quantity of this cottony substance. A few years ago, a Mr. Helliwell, of Greenhurst-Hey, near Todmorden, attempted to bring this substance into manufacturing use, and made some specimens of stocking-yarn, and a firm and beautiful cloth, with wool of the cotton-grasses grown on his estate, and the calculation was, that this wool might, without cultivation, be obtained from many parts of Stonesfield common, near Todmorden, at the cost of twopence or threepence per pound, and in quantity of two or three hundredweights per acre. In Lapland the cotton of *E. polystachyon* is used for making fabrics and for stuffing pillows, and the plant is regarded in Russia as a remedy in epilepsy and spasmodic affections. In India, *E. cannabinum*, a native of the Himalayas, is extensively employed in the manufacture of cordage. It is called *bhabhur* and *bhabhuree*, and grows abundantly in all the ravines up the sides of the mountains. All the rope-bridges of the districts where it grows are made of this plant, twisted into cables of a considerable thickness, but it does not last above a twelvemonth, and therefore they require constant repair. The *Bulrush* (*Scirpus lacustris*) is very much used for bottoms to chairs, and if cut when one year old, they make fine bottoms. Either alone or mixed with the leaves of *Iris pseud-acorus*, they make excellent mats; it was formerly used for stuffing pack-saddles. Its principal use in the present day is by coopers, who put it between the staves of casks to render them water-tight. The plant grows in marshy places in this country, but the chief supply comes from Holland. The root was at one time considered astringent and diuretic. *S. tuberosus* is a native of India, and its root-stock is used as a vegetable. *Scleria lithospermifolia* is regarded in India as an antinephritic. The long, straight leaves of *S. flagellum* are armed with fine sharp-cutting teeth, and are made into whips for flogging negro slaves in the West Indies. *Carex arenaria*, or *Sea Seg*, is the plant so carefully planted on the dykes in Holland for the purpose of binding the sand by the interlacing of their roots, and thereby strengthening the embankment against the action of the sea. The roots are long, knotted, and the thickness of a goose's quill, with a slightly aromatic odour, and a camphorous flavour; they constitute what is called *German Sarsaparilla*, which has been used with some success in Germany in syphilitic and rheumatic affections. They contain 16 of starch, 20 of watery extract, and 10 per cent. of alcoholic extract. The watery extract is of a sweetish taste at first, afterwards slightly astringent. The alcoholic extract is rather bitter, and in odour like the resin of guaiacum. The roots of *C. distachya* and *C. hirta* are similarly used; and Linneus remarks that the Laplanders cover their legs and hands with the leaves of these plants, and, notwithstanding the excessive cold of the country, they never have chilblains.

ORDER CCXLIX.—GRAMINEÆ—GRASSES.



Fig. 227. *Gyncrium argenteum*. A, A spikelet of the Oat, to show the interior parts; B, the same in its natural state; C, a fertile flower, with the glumes and palea removed; D, section of the seed, showing the embryo.

ANNUAL or perennial herbaceous plants, sometimes woody, and then acquiring large dimensions, like the Bamboo; they have a root-stock, which is either fibrous or bulbous, and which throws up cylindrical stems that are generally hollow, but sometimes solid, closed at the joints, and

covered with a coating of silex. *Leaves* arising from the joints, alternate, distichous, narrow, and undivided, having a split sheath, which embraces the stem, and a membranous tongue-like body, called the *ligule*, at the junction of the blade and sheath. *Flowers* generally hermaphrodite, rarely unisexual, solitary, or several together on a short axis, forming spikelets which are called *locustæ*. These *spikelets* are either sessile, alternate, and distichous on a simple axis called a *rachis*, and forming a spike, or borne on long slender peduncles forming a panicle; they are composed of two series of imbricated tracts, of which the two exterior are called *glumes*, and the two interior that immediately enclose each flower, *paleæ*; in some cases there are from one to three very small and membranous hypogynous scales, enclosing the essential organs of reproduction, and are called *squamulæ* or *lodiculæ*, and by some these are regarded as a perianth. *Stamens* hypogynous, generally three, rarely one, two, four, or six, sometimes even more; *anthers* versatile, two-celled. *Ovary* simple, one-celled, containing an ovule attached the whole of its length to the inner wall, or to the base of the cell. *Styles* two, more or less united by their base; *stigmas* two, feathery, simple, or branching, very rarely three or one. *Fruit* naked, or enclosed in the persistent paleæ. *Embryo* lying on one side of farinaceous albumen next the hilum.

TRIBE 1. *Oryzææ*.—Spikelets one to three-flowered; one or two of the inferior flowers are neuter and unipaleate, the terminal one fertile. Paleæ rigid and parchment-like. Flowers often diclinous, and with six stamens.

GENERA AND SYNONYMS.

<i>Leersia</i> , Sol.	<i>Maltebrunia</i> , Kth	<i>Melinum</i> , Lk.	<i>Trochera</i> , Rich.
<i>Asprella</i> , Schrb.	<i>Padia</i> , Zoll.	<i>Zizania</i> , L.	<i>Tetrarrhena</i> , R. Br.
<i>Homalocenchrus</i> ,	<i>Anomochloa</i> ,	<i>Hygroryza</i> , Nees.	<i>Microlæna</i> , R. Br.
[Micq.]	[Brongn.]	<i>Caryochloa</i> , Trin.	<i>Diplax</i> , Sol.
<i>Blepharochloa</i> Endl	<i>Potamophila</i> , R. Br.	<i>Arrozia</i> , Schrd.	<i>Pharus</i> , P. Br.
<i>Potamochloa</i> , Griff.	<i>Hydrochloa</i> , P. Br.	<i>Iuziola</i> , Juss.	<i>Leptaspis</i> , P. Br.
<i>Oryza</i> , L.	<i>Hydropyrum</i> , Lk.	<i>Ehrharta</i> , Th.	

TRIBE 2. *Phalareææ*.—Spikelets hermaphrodite, or polygamous, rarely monœcious, sometimes one-flowered, with or without the rudiment of another superior flower, sometimes two or three-flowered, the terminal one fertile, the others incomplete. Glumes generally equal. Paleæ generally spiny. Styles and stigmas commonly elongated.

GENERA AND SYNONYMS.

<i>Lygeum</i> , L.	<i>Antitragus</i> , Gärt.	<i>Beckmannia</i> , Host.	<i>Prionachne</i> , Nees
<i>Zea</i> , L.	<i>Helcochloa</i> , Host.	<i>Joachimias</i> , Ten.	<i>Hilaria</i> , H. B. K.
<i>Reana</i> , Brign.	<i>Mibora</i> , Ad.	<i>Bruchmannia</i> ,	<i>Hexarrhena</i> , Prl.
<i>Beckera</i> , Fresn.	<i>Knappia</i> , Sm.	[Nutt.]	<i>Phalaris</i> , L.
<i>Coix</i> , L.	<i>Sturmia</i> , Hopp.	<i>Phleum</i> , L.	<i>Lasiolytrum</i> , St.
<i>Lithagrostis</i> , Gärt	<i>Chamagrostis</i> ,	<i>Stelephurus</i> , Ad.	<i>Digraphis</i> , Trin.
<i>Chionanche</i> , R. Br.	[Borkh.]	<i>Chilochloa</i> , Pal.	<i>Baldingera</i> , Gärt.
<i>Sclerachne</i> , R. Br.	<i>Alopecurus</i> , L.	<i>Achnodonton</i> Pal	<i>Typhoides</i> , Mün.
<i>Polytoca</i> , R. Br.	<i>Colobachne</i> , Pal.	<i>Achnodon</i> , Lk.	<i>Holcus</i> , L.
<i>Cornucopia</i> , L.	<i>Tozzettia</i> , Savi.	<i>Fingerhuthia</i> , Nees.	<i>Reynaudia</i> , Kunth.
<i>Crypsis</i> , Ait.	<i>Limnas</i> , Trin.	<i>Chondrolæna</i> , Nees.	<i>Despretzia</i> , Kunth.

TRIBE 3. *Panicææ*.—Spikelets two-flowered; lower flower incomplete. Glumes of a slighter texture than the paleæ, sometimes only one or more. Paleæ usually awnless, the lower one concave. Fruit (caryopsis) compressed parallel with the embryo.

GENERA AND SYNONYMES.

Reimaria, <i>Flügg.</i>	Rhynchelytrum,	Rottboella, <i>Sw.</i>	Cenchrus, <i>L.</i>
Paspalum, <i>L.</i>	[<i>Nees.</i>	Acratherum, <i>Lk.</i>	Panicastrella,
Axonopus, <i>R. & S.</i>	Panicum, <i>L.</i>	Berghausia, <i>Endl.</i>	[<i>Miehel.</i>
Ceresia, <i>Pers.</i>	Digitaria, <i>Scop.</i>	Miquelia, <i>Nees.</i>	Trachyzus, <i>Rehb.</i>
Garnotia, <i>Brongn.</i>	Dactylon, <i>Vell.</i>	Melinis, <i>Pal.</i>	Trachys, <i>Pers.</i>
Milium, <i>L.</i>	Syntherisma,	Suardia, <i>Sehrk.</i>	Trachystachys,
Miliarium, <i>Mön.</i>	[<i>Schrad.</i>	Tristegis, <i>Nees.</i>	[<i>Dietr.</i>
Leptocoryphium,	Hymenachne <i>Pal</i>	Thysanulæna, <i>Nees.</i>	Antheophora, <i>Schrö.</i>
[<i>Nees.</i>	Streptostachys,	Chaetium, <i>Nees.</i>	Colladoa, <i>Pers.</i>
Amphicarpum, <i>Raf</i>	[<i>Pal.</i>	Oplismenus, <i>Pal.</i>	Lappago, <i>Schrö.</i>
Olyra, <i>L.</i>	Monachne, <i>Pal.</i>	Orthopogon, <i>R.Br</i>	Tragus, <i>Hall.</i>
Lithachne, <i>Pal.</i>	Aulaxanthus, <i>Ell</i>	Hippagrostis,	Lopholepis, <i>Decne.</i>
Raddia, <i>Bert.</i>	Aulaxia, <i>Nutt.</i>	[<i>Rumph.</i>	Holboellia, <i>Wall.</i>
Strepium, <i>Schrad.</i>	Thalasium, <i>Sp.</i>	Echinochloa, <i>Pal</i>	Latipes, <i>Kunth.</i>
Thrasya, <i>Kunth.</i>	Trichachne, <i>Nees.</i>	Berchtoldia, <i>Presl.</i>	Echinolæna, <i>Desv.</i>
Eriochloa, <i>Kunth.</i>	Otachyrium, <i>Nees</i>	Chamaeraphis, <i>R.Br</i>	Navicularia, <i>Bert.</i>
Cedipachne, <i>Lk.</i>	Ichnanthus, <i>Pal.</i>	Pennisetum, <i>Rieh.</i>	Thouarea, <i>Pers.</i>
Helopus, <i>Trin.</i>	Bluffia, <i>Nees.</i>	Setaria, <i>Pal.</i>	Microthouarea,
Urochloa, <i>Pal.</i>	Isachne, <i>R. Br.</i>	Gymnothryx, <i>Pal.</i>	[<i>Thouars.</i>
Axonopus, <i>Pal.</i>	Mencritaria,	Catantrophora, <i>St</i>	Spinifex, <i>L.</i>
Coridochloa, <i>Nees</i>	[<i>Herm.</i>	Beckera, <i>Fres.</i>	Neurachne, <i>R. Br.</i>
	Stenotaphrum <i>Tri</i>	Penicillaria, <i>Sw.</i>	

TRIBE 4. *Stipeææ*.—Spikelets one-flowered. Lower valve of the paleæ involute, awned at the apex, becoming undulated at maturity, and often united with the fruit; awn simple, or trifid, generally twisted and jointed at the base. Ovary stipitate, surrounded with three scales or lodicules.

GENERA AND SYNONYMES.

Oryzopsis, <i>Rich.</i>	Orthoraphium <i>Nees</i>	Jarava, <i>R. & P.</i>	Pseudachne <i>Endl</i>
Dilepyrum, <i>Raf.</i>	Macrochloa, <i>Kth.</i>	Eriocoma, <i>Nutt.</i>	Streptachne,
Greenia, <i>Nutt.</i>	Stipa, <i>L.</i>	Streptachne, <i>R. Br.</i>	[<i>Kunth.</i>
Piptatherum, <i>Pal.</i>	Nasella, <i>Trin.</i>	Aristida, <i>L.</i>	Arthratherum,
Urachne, <i>Trin.</i>	Piptochaetium, —	Chaetaria, <i>Palis.</i>	[<i>Pal.</i>
Lasiagrostis, <i>Lk.</i>	Aristella, <i>Trin.</i>	Curtopogon, <i>Pal.</i>	Stipagrostis, <i>Nees.</i>
Dichelaehne, <i>Endl.</i>			

TRIBE 5. *Agrostææ*.—Spikelets one-flowered, rarely with an awl-shaped rudiment of a second flower. Glumes and paleæ membranous; the lower paleæ often awned. Stigmas usually sessile.

GENERA AND SYNONYMES.

Mühlenbergia,	Colcanthus, <i>Seid.</i>	Helcochloa, <i>Pal.</i>	Apera, <i>Palis</i>
[<i>Schrö.</i>	Schmidia, <i>Tratt.</i>	Agrosticula,	Gastridium, <i>Pal.</i>
Podosœum, <i>Kth.</i>	Willibalda, <i>Stern</i>	[<i>Raddi.</i>	Nowodworskya <i>Pal</i>
Trichochloa, <i>Trin</i>	Phippsia, <i>R. Br.</i>	Calotheca, <i>St.</i>	Raspailia, <i>Prl.</i>
Dilepyrum, <i>Mz.</i>	Colpodium, <i>Trin.</i>	Agrostis, <i>L.</i>	Chaetotropis, <i>Kth.</i>
Brachelytrum,	Cinna, <i>L.</i>	Trichodium, <i>Auet</i>	Polypogon, <i>Desf.</i>
[<i>Pal.</i>	Epicampes, <i>Presl.</i>	Vilfa, <i>Auet.</i>	Chaeturus, <i>Lk.</i>
Cleomena, <i>Pal.</i>	Echinopogon, <i>Pal.</i>	Anemagrostis,	Agopogon, <i>W.</i>
Lycurus, <i>H. B. K.</i>	Spirobolus, <i>R. Br.</i>	[<i>Trin.</i>	Percilema, <i>Presl.</i>

TRIBE 6. *Arundææ*.—Spikelets one-flowered, with or without the pedicel of an abortive flower, or many-flowered. Flowers surrounded with long, silky hairs. Glumes and paleæ each of two valves, membranous; glumes often longer than the flowers, and the lower valve of the paleæ frequently awned.

GENERA AND SYNONYMES.

<i>Sericura</i> , Hassk.	<i>Psamma</i> , Pal.	<i>Scalochloa</i> , Koch.	<i>Phragmites</i> , Trin.
<i>Calamagrostis</i> , Ad.	<i>Amagris</i> , Raf.	<i>Trichoon</i> , Roth.	<i>Czernya</i> , Presl.
<i>Deyeuxia</i> , Clar.	<i>Psammaphila</i> , Fries	<i>Donacium</i> , Fries.	<i>Amphidonax</i> , Nees.
<i>Lachnagrostis</i> , Trin	<i>Arundo</i> , L.	<i>Ampelodesmos</i> , Lk.	<i>Gynierium</i> , H. B. K.
<i>Pentapogon</i> , R. Br.	<i>Donax</i> , Pal.	<i>Graphephorum</i> ,	
<i>Ammophila</i> , Host.		[Desv.]	

TRIBE 7. *Pappophorææ*.—Spikelets two or many-flowered, the superior ones frequently withering. Glumes and paleæ two, membranous; lower valve of the palea three or many-eleft, and the segments awned.

GENERA AND SYNONYMES.

<i>Amphipogon</i> , R. Br.	<i>Dipogonia</i> , Pal.	<i>Enneapogon</i> , Desv.	<i>Cottrea</i> , Kunth.
<i>Gamelythrum</i> , Nees	<i>Trirrhaphis</i> , R. Br.	<i>Polyrhaphis</i> , Trin.	<i>Echinaria</i> , Desv.
<i>Wilhelmsia</i> , Koch.	<i>Pappophorum</i> ,	<i>Eurhaphis</i> , Trin.	<i>Panicastrella</i> Mön.
<i>Diplopogon</i> , R. Br.	[Schr.]	<i>Corethrum</i> , Vahl.	<i>Cathestecum</i> , Presl.

TRIBE 8. *Chlorææ*.—Spikelets collected into a one-sided spike, one or many-flowered; superior flowers abortive. Glumes and paleæ two, membranous; the paleæ awned or awnless. Glumes adnate to the rachis, persistent. Spikes digitate or panicle, rarely solitary. Rachis not jointed.

GENERA AND SYNONYMES.

<i>Microchloa</i> , R. Br.	<i>Geopogon</i> , Endl.	<i>Ctenopsis</i> , De Not.	<i>Aristidium</i> , Endl.
<i>Schœncelfeldia</i> , Kth.	<i>Tetrapogon</i> , Desv.	<i>Schellingia</i> , St.	<i>Heterostega</i> , Desv.
<i>Cynodon</i> , Rich.	<i>Leptochloa</i> , Palis.	<i>Melanocenchris</i> , Ns	? <i>Enteropogon</i> ,
<i>Digitaria</i> , Juss.	<i>Leptostachys</i> ,	<i>Chondrosium</i> , Desv.	[Nees.]
<i>Fibigia</i> , Kth.	[Meyer.]	<i>Actinochloa</i> , W.	<i>Triplathera</i> , Endl.
<i>Capriola</i> , Ad.	<i>Oxydenia</i> , Nutt.	<i>Bouteloua</i> , Lag.	<i>Triathera</i> , Desv.
<i>Cabrera</i> , Lagasc.	<i>Diplachne</i> , Pal.	<i>Opizia</i> , Presl.	<i>Gymnopogon</i> , Pal.
<i>Dictyloctenium</i> , W	<i>Eleusine</i> , Gärtn.	<i>Spartina</i> , Schrb.	<i>Polyodon</i> , H. B. K.
<i>Eustachys</i> , Desv.	<i>Harpoenchloa</i> , Kth.	<i>Limnætis</i> , Rich.	<i>Pentarhaphis</i> , Kth.
<i>Schultesia</i> , Sp.	<i>Ctenium</i> , Panz.	<i>Trachynotia</i> , Mx.	<i>Polyschistis</i> , Presl.
<i>Chloris</i> , Sw.	<i>Campulosa</i> , Desv.	<i>Ponceletia</i> , Thou.	<i>Trienia</i> , Kunth.
<i>Apogon</i> , Endl.	<i>Campulosus</i> , Pal.	<i>Eutriana</i> , Trin.	<i>Triplasis</i> , Palis.
<i>Euchloris</i> , Kth.	<i>Monocera</i> , Elliot.	<i>Dineba</i> , Pal.	<i>Pleurhaphis</i> , Torr.
<i>Actinochlois</i> ,	<i>Monothera</i> , Raf.	<i>Atheropogon</i> , Mühl.	<i>Bromidium</i> , Nees.
[Panz.]			

TRIBE 9. *Avenææ*.—Spikelets two or many-flowered, the terminal flower generally rudimentary. Glumes and paleæ two, membranous; lower palea usually awned; the awn generally on the back of the palea, and twisted.

GENERA AND SYNONYMES.

<i>Microchloe</i> , Gmel.	<i>Anthoxanthum</i> , L.	<i>Corynephorus</i> , Pal.	<i>Deschampsia</i> , Pal.
<i>Disarrhenum</i> Lab	<i>Ataxia</i> , R. Br.	<i>Weingärtneria</i> ,	<i>Campella</i> , Lk.
<i>Dimeria</i> , Raf.	<i>Podopogon</i> , Ehrenb	[Bernh.]	<i>Dupontia</i> , R. Br.

Aira, <i>L.</i>	Koeleria, <i>Lk.</i>	Monopogon, <i>Prsl</i>	Triathera, <i>Roth.</i>
? Periballia, <i>Trin.</i>	Trichæta, <i>Pal.</i>	Anisopogon, <i>R. Br.</i>	Pentameris <i>Palis</i>
? Poidium, <i>Nees.</i>	Acrospelson, <i>Bess.</i>	Trichoptera, <i>Nees.</i>	Chaetobromus, <i>Nees</i>
Autinoria, <i>Parl.</i>	Ventenata, <i>Kölr.</i>	Eriachne, <i>R. Br.</i>	Uralespis, <i>Nutt.</i>
Airiopsis, <i>Desv.</i>	Avena, <i>L.</i>	Achneria, <i>Falis.</i>	Diploca, <i>Raf.</i>
Trisetaria, <i>Forsk.</i>	?Leptopyrum <i>Raf</i>	Brandtia, <i>Kunth.</i>	Windsoria, <i>Nutt.</i>
Lagurus, <i>L.</i>	Gaudinia, <i>Pal.</i>	Danthonia, <i>DC.</i>	Tricuspis, <i>Pal.</i>
Trisetum, <i>Kunth.</i>	Arthrostachya <i>Lk</i>	Sicglingia, <i>Bernh</i>	Tridens, <i>R. & S.</i>
Colobanthus, <i>Trin.</i>	Arrhenatherum <i>Pal</i>	Triodia, <i>Pal.</i>	Triodia, <i>R. Br.</i>
Rostraria, <i>Trin.</i>	Tristachya, <i>Nees.</i>	Tripogon, <i>R. & S.</i>	Pommereulla, <i>L. f.</i>

TRIBE 10. *Festuceæ*.—Spikelets many-flowered. Glumes and paleæ two, membranaceous, rarely leathery; lower palea usually awned; awn not twisted. Flowers generally in panicles.

GENERA AND SYNONYMES.

BROMIDÆ.			
Sesleria, <i>Ard.</i>	Calotheca, <i>Kunth.</i>	Plagielytrum <i>Nees</i>	Miegia, <i>Pers.</i>
Oreochloa, <i>Lk.</i>	Anthochloa, <i>Nees.</i>	Festuca, <i>L.</i>	Ludolfia, <i>W.</i>
Psilathera, <i>Lk.</i>	Melica, <i>L.</i>	Schlerochloa <i>Pers</i>	Triglossum, <i>Fisch</i>
Poa, <i>L.</i>	Bulbilis, <i>Raf.</i>	Sphenopus, <i>Trin.</i>	Macronax, <i>Raf.</i>
Æluropus, <i>Trin.</i>	Molinia, <i>Mön.</i>	Catapodium, <i>Lk.</i>	Arthrostylidium,
Brizopyrum, <i>Lk.</i>	Airochloa, <i>Link.</i>	Brachypodium,	[<i>Ruppr.</i>
Distichis, <i>Raf.</i>	Köleria, <i>Link.</i>	[<i>Pal.</i>	Phyllostachys, <i>Sieb</i>
Eragrostis, <i>Pal.</i>	Collinaria, <i>Ehrh.</i>	Vulpia, <i>Gmel.</i>	Streptogyna, <i>Pal.</i>
Megastachya,	Ægialitis, <i>Trin.</i>	Mygalurus, <i>Lk.</i>	Chusquea, <i>Kunth.</i>
[<i>Palis.</i>	Ægialina, <i>Schl.</i>	Schedonorus, <i>Pal</i>	Rettbergia <i>Raddi</i>
Dissanthelium <i>Trin</i>	Lophochloa, <i>Rehb</i>	Amphibromus,	Platonina, <i>Knth.</i>
Tetrachne, <i>Nees.</i>	Harpachne, <i>Hochst.</i>	[<i>Nees.</i>	Dendragrostis,
Phalaridium, <i>Nees.</i>	Nardurus, <i>Boiss.</i>	Bromus, <i>L.</i>	[<i>Nees.</i>
Centotheca, <i>Desv.</i>	Anisantha, <i>Koch.</i>	Ceratochloa, <i>Pal.</i>	Merostachys, <i>Sp.</i>
Glyceria, <i>R. Br.</i>	Rœgneria, <i>Koch.</i>	Libertia, <i>Lej.</i>	Guadua, <i>Kunth.</i>
Devauxia, <i>Pal.</i>	Schismus, <i>Palis.</i>	Michellaria, <i>Dum.</i>	Nastus, <i>Juss.</i>
Hydrochloa, <i>Lk.</i>	Hemisacris, <i>St.</i>	Serrafalcus, <i>Parl.</i>	Stemmatosper-
Exydra, <i>Endl.</i>	Wangenheimia <i>Mön</i>	Orthoclada, <i>Pal.</i>	[<i>mum, Pal.</i>
Lophochlœna, <i>Nees.</i>	Dactylis, <i>L.</i>	Uniola, <i>L.</i>	Schizostachyum,
Pleuropogon, <i>R. Br.</i>	Lasiochloa, <i>Kunth.</i>	Chasmanthium,	[<i>Nees.</i>
Eatonina, <i>Raf.</i>	Urochlena, <i>Nees.</i>	[<i>Link.</i>	Bambusa, <i>Schreb.</i>
Reboulea, <i>Kth.</i>	Cynosurus, <i>L.</i>	Trisiola, <i>Raf.</i>	Arundarbor <i>Bauh</i>
? Chondrachyum	Chrysurus, <i>Palis.</i>	Diarrhena, <i>Palis.</i>	Dendrocalamus,
[<i>Nees.</i>	Lanarekia, <i>Mön.</i>	Diarina, <i>Raf.</i>	[<i>Nees.</i>
Catabrosa, <i>Palis.</i>	Pterium, <i>Desv.</i>	Rœmeria, <i>Zea.</i>	Aulonemia, <i>Goudot.</i>
Cœlachne, <i>R. Br.</i>	Ectrosia, <i>R. Br.</i>	Corycarpus, <i>Zea.</i>	Acroelytrum, <i>St.</i>
Briza, <i>L.</i>	Lophatherum,	—	Beesha, <i>Rheed.</i>
? Neurocoma, <i>Raf</i>	[<i>Brongn.</i>		Melocanna, <i>Rop.</i>
Chascolytrum, <i>Desv</i>	Elytrophorus, <i>Palis</i>		Streptochaeta, <i>Nees.</i>
	Echinalysium,		Lepideilema <i>Trin</i>
	[<i>Trin.</i>		
		BAMBUSIDÆ.	
		Arundinaria, <i>Rich.</i>	

TRIBE 11. *Hordeæ*.—Spikelets three or many-flowered, rarely one-flowered, sessile on opposite sides of a zigzag, channeled and toothed, sometimes jointed rachis, forming a solitary spike; the terminal flower rudimentary. Glumes and paleæ two, herbaceous, the former sometimes, but seldom, wanting, the lower palea frequently awned; the awn not twisted. Stigmas sessile. Ovary generally hairy.

GENERA AND SYNONYMS.

<i>Lolium</i> , <i>L.</i>	<i>Pycnopyrum</i> ,	<i>Cuviera</i> , <i>Köl.</i>	<i>Hystrix</i> , <i>Mön.</i>
<i>Cræpalia</i> , <i>Schrnk.</i>	[<i>Koch.</i>	? <i>Sitanion</i> , <i>Raf.</i>	<i>Hordeum</i> , <i>L.</i>
<i>Triticum</i> , <i>L.</i>	<i>Heteranthelium</i> ,	<i>Critho</i> , <i>E. Meyer.</i>	<i>Zoocriton</i> , <i>Palis.</i>
<i>Spelta</i> , <i>Endl.</i>	[<i>Hochst.</i>	<i>Crithopsis</i> , <i>Jaub.</i>	<i>Critesium</i> , <i>Raf.</i>
<i>Agropyrum</i> , <i>Pal.</i>	<i>Secale</i> , <i>L.</i>	<i>Gymnostichum</i> ,	<i>Ægilops</i> , <i>L.</i>
<i>Trachynia</i> , <i>Lk.</i>	<i>Elymus</i> , <i>L.</i>	[<i>Schrb.</i>	<i>Polyantherix</i> , <i>Nees.</i>
<i>Eremopyrum</i> <i>Ledeb</i>	<i>Psammoehloa</i> ,	<i>Asprella</i> , <i>Humb.</i>	<i>Pariana</i> , <i>Aubl.</i>
	[<i>Endl.</i>		

TRIBE 12. *Rottboellææ*.—Spikelets one or two, rarely three-flowered, lying in the cavities of the rachis, either solitary or in pairs, one of which is pedicellate and often rudimentary. One of the flowers, when there are two, is usually incomplete. Glumes one or two, seldom none, and usually leathery. Paleæ membranous, rarely awned. Styles one or two, sometimes very short or wanting. Flowers arranged in spikes, on a generally jointed rachis.

GENERA AND SYNONYMS.

<i>Nardus</i> , <i>L.</i>	<i>Syurus</i> , <i>Endl.</i>	<i>Mnesithea</i> , <i>Kunth.</i>	<i>Cœlorhaechis</i> ,
<i>Psilurus</i> , <i>Trin.</i>	<i>Pholurus</i> , <i>Trin.</i>	<i>Thyridostachyum</i>	[<i>Brongn.</i>
<i>Asprella</i> , <i>Host.</i>	<i>Oropetium</i> , <i>Trin.</i>	[<i>Nees.</i>	<i>Ratzeburgia</i> , <i>Knth.</i>
<i>Monerma</i> , <i>Pal.</i>	<i>Didactylon</i> , <i>Zoll.</i>	<i>Rottboella</i> , <i>R. Br.</i>	<i>Aikinia</i> , <i>Wall.</i>
<i>Lepturus</i> , <i>R. Br.</i>	<i>Ophiurus</i> , <i>Gürtn.</i>	<i>Hemipus</i> , <i>Endl.</i>	<i>Xerochloa</i> , <i>R. Br.</i>
<i>Nyurus</i> , <i>Endl.</i>	<i>Hemarthria</i> , <i>R. Br.</i>	<i>Stegosia</i> , <i>Lour.</i>	<i>Tripsacum</i> , <i>L.</i>
<i>Mierurus</i> , <i>Endl.</i>	<i>Lodicularia</i> , <i>Palis</i>	? <i>Cynbachne</i> <i>Retz</i>	<i>Manisuris</i> , <i>L.</i>
<i>Monerma</i> , <i>Palis.</i>	<i>Vossia</i> , <i>Wall & Griff</i>		<i>Peltophorus</i> , <i>Dsv.</i>

TRIBE 13. *Andropogonææ*.—Spikelets two-flowered, the lower flower always incomplete. Paleæ thinner than the glumes, usually transparent.

GENERA AND SYNONYMS.

<i>Perotis</i> , <i>Ait.</i>	<i>Pogonatherum</i> , <i>Pal.</i>	<i>Anatherum</i> , <i>Pal.</i>	<i>Psilopogon</i> , <i>Hochst.</i>
<i>Xystidium</i> , <i>Trin.</i>	<i>Homeoplitis</i> <i>Trin</i>	<i>Cymbopogon</i> , <i>Sp.</i>	<i>Myriacheta</i> , <i>Zoll.</i>
<i>Leptothrium</i> <i>Kunth</i>	<i>Erianthus</i> , <i>Rich.</i>	<i>Hypogynium</i> ,	<i>Heteropogon</i> , <i>Pers.</i>
<i>Zoysia</i> , <i>W.</i>	<i>Ripidium</i> , <i>Trin.</i>	[<i>Nees.</i>	<i>Ischænum</i> , <i>L.</i>
<i>Epiphytis</i> , <i>Trin.</i>	? <i>Microstegium</i> ,	<i>Agenium</i> , <i>Nees.</i>	<i>Schima</i> , <i>Forsk.</i>
<i>Matrella</i> , <i>Pers.</i>	[<i>Nees.</i>	<i>Trachypogon</i> , <i>Nees.</i>	<i>Meosehium</i> , <i>Pal.</i>
<i>Osterdamia</i> , <i>Neck</i>	<i>Eulalia</i> , <i>Kunth.</i>	<i>Schizachirum</i> ,	<i>Colladoa</i> , <i>Cav.</i>
<i>Dimeria</i> , <i>R. Br.</i>	<i>Leptatherum</i> , <i>Nees.</i>	[<i>Nees.</i>	<i>Spodiopogon</i> ,
<i>Haplachne</i> , <i>Presl.</i>	<i>Apocpis</i> , <i>Nees.</i>	<i>Pithecurus</i> , <i>W.</i>	[<i>Trin.</i>
<i>Arthraxon</i> , <i>Palis.</i>	<i>Elionurus</i> , <i>Kunth.</i>	<i>Sorghum</i> , <i>Pers.</i>	<i>Arundinella</i> ,
<i>Pleuroplitis</i> , <i>Trin</i>	<i>Anthistiria</i> , <i>L.</i>	<i>Blumenbachia</i> ,	[<i>Raddi.</i>
<i>Lucæa</i> , <i>Kunth.</i>	<i>Themeda</i> , <i>Forsk.</i>	[<i>Köl.</i>	<i>Goldbachia</i> , <i>Trin.</i>
<i>Eriochrysis</i> , <i>Palis.</i>	<i>Perobachne</i> , <i>Presl.</i>	<i>Andropogon</i> , <i>L.</i>	<i>Riedelia</i> , <i>Trin.</i>
<i>Plazerium</i> , <i>W.</i>	<i>Androseopia</i> ,	<i>Pollinia</i> , <i>Sp.</i>	<i>Thysanachne</i> , <i>Prl</i>
<i>Saccharum</i> , <i>L.</i>	[<i>Brongn.</i>	<i>Chrysopogon</i> ,	<i>Pogonopsis</i> , <i>Presl.</i>
<i>Phragmites</i> , <i>Ad.</i>	<i>Dictomis</i> , <i>Kunth.</i>	[<i>Trin.</i>	<i>Thelepogon</i> , <i>Roth.</i>
<i>Saccharophorum</i> ,	<i>Apluda</i> , <i>L.</i>	? <i>Rhaphis</i> , <i>Lour.</i>	<i>Arthropogon</i> , <i>Nees.</i>
[<i>Neck</i>	<i>Dictomis</i> , <i>Pal.</i>	<i>Centrophorum</i> ,	<i>Zeugites</i> , <i>P. Br.</i>
<i>Tricholæna</i> <i>Schrd</i>	<i>Batratherum</i> , <i>Nees.</i>	[<i>Trin.</i>	<i>Alloteropsis</i> , <i>Presl.</i>
<i>Eriopogon</i> , <i>Endl.</i>	<i>Hologamium</i> , <i>Nees.</i>	<i>Monachysion</i> , <i>Parl.</i>	<i>Blyttia</i> , <i>Fries.</i>
<i>Imperata</i> , <i>Cyrill.</i>	<i>Lepeocercis</i> , <i>Trin.</i>	<i>Alectoria</i> , <i>Rich.</i>	

DOUBTFUL GENERA.

<i>Pterium</i> , <i>Desv.</i>	<i>Xenochloa</i> , <i>Lichtenst.</i>	<i>Heterelytron</i> , <i>Jungh.</i>
<i>Rytachne</i> , <i>Desv.</i>	<i>Caryochloa</i> , <i>Sp.</i>	<i>Aristaria</i> , <i>Jungh.</i>

GEOGRAPHICAL DISTRIBUTION.—There is no part of the world from which these are excluded, but they abound most in the north temperate regions, and diminish towards the equator.

PROPERTIES AND USES.—No family of the vegetable kingdom claims so much consideration as the Grasses, and no one at all approaches it in importance to man, as a means of existence, and as a source of great commercial wealth. The two articles, Wheat and Sugar, would alone be sufficient to warrant such a statement; but added to these we have Barley, Oats, Rye, Indian Corn, and Rice, as cereals, besides the numerous species that supply fodder to domesticated animals, all contributing in one way or another to the wants and necessities of the human family. Not only are we dependent on them for food, but even our beverages, beer, porter, and ale, and the spirituous liquors, whisky, gin, and rum (which cannot, however, be considered beverages), are all derived from this important order. They seem to be specially intended for human subsistence, as every climate has species peculiarly adapted to it; the temperate and colder regions producing wheat, barley, oats, and rye, while the tropical and subtropical have their maize, rice, sorghum, millet, and sugar-cane. Not only their seeds and herbage, but even their dried stems contribute to many wants; with these, straw-hats, women's bonnets, matting, cordage, and baskets are formed, houses are thatched, and paper is made.

Oryzæ.—*Rice* (*Oryza sativa*) is a native of the East, according to Linnæus of Ethiopia, and to others of India, but it is now spread over the tropical and sub-tropical regions of both hemispheres. It may almost be asserted that three-fourths of the population of the known world exist on this grain, so that even wheat itself is not more valuable to the human race. The plant is annual, and varies in height from one to six feet, according to the variety, of which there are no less than twenty enumerated. Besides being cultivated in Asia, Africa, and America, it has long been introduced to the countries on the north shore of the Mediterranean; but, although certain varieties are cultivated with success in Turkey, Greece, Italy, and Spain, none of the produce equals those of Carolina and Bengal. Some attempts have been made to grow it in Central Europe, Russia, Holland, and even in England, but without any beneficial results. The plant delights in wet, marshy situations, and the rice-grounds are therefore in low, flat-lying countries, where water is abundant, and irrigation can be practised when necessary. The seed of the plant, deprived of its husk, is the rice of commerce; before it is husked it is called *Paddy*. As an article of food, rice is highly nutritious, easy of digestion, and well suited for weak stomachs, and to convalescents; being wholly free from laxative properties, it is well adapted to cases of weak bowels, in which there is a tendency to diarrhœa. Although it constitutes the principal food of a great portion of the human race, with us it is more used as a luxury than an aliment; it is generally employed made into puddings, cakes, jellies, and soups, or boiled with milk and eaten with sugar, preserved fruits, or other adjuncts; simply boiled in water till it is quite soft, it has of late years come into more general use as an accompaniment to meat instead of potatoes, and the repeated failure of that crop tends to increase its consumption in that form. Carolina rice was found, by Braconnot, to contain 85·07 per cent of starch; 3·60 of gluten; 0·71 of gum; 0·29 of uncrystallisable sugar; 0·13 of fixed oil;

4·80 of vegetable fibre; 5·00 of water, and 0·40 of saline substances. It is the small quantity of gluten that prevents the conversion of rice into bread; and here we see the wisdom of an all-bountiful Providence, in supplying to those peoples, living in tropical climates, an aliment that can be prepared without much exertion or labour of any kind; an earthen pot and a small fire being sufficient to enable the Indian to boil his rice, and enjoy a meal, which he adroitly eats with his fingers, and which involves the exertion neither of grinding, making, nor baking, which the inhabitants of colder climates have to undergo.

Besides being used as food, there are other economical purposes to which rice is applied. In Nepaul a spirit is distilled from the grain, and a beverage, called by the natives *phaur*, very much resembling our ale, and procured nearly in the same manner. Although the laws of the Birman and Siamese forbid wine or intoxicating liquors, they make a spirit from rice, which they call *Jau*. Two kinds of fermented liquor are prepared from rice by the natives of Java. The first, called *Bádek*, is made by first boiling and stewing the rice, with a ferment called *razi*, consisting of onions, black pepper, and capsicum, and mixing the whole into small cakes, which are daily sold in the markets. After frequent stirring, the mixture is rolled into balls, which are piled upon each other in a high earthen vessel, and, when fermentation has commenced, the *bádek* exudes, and is collected at the bottom. The remainder, after fermentation is completed, has a sweet taste, and is sold as a dainty in the markets, under the name of *Táfé*. *Brom* is the second kind, and is made from *ketan*, or glutinous rice. It is boiled in large quantities, and being stirred with *razi*, remains exposed in open tubs, till fermentation takes place, when the liquor is poured off into close earthen vessels. It is generally buried for several months in the earth, by which means the fermentation is checked, and the strength of the liquor is increased; it is sometimes made strong by boiling. The colour varies from brown to red and yellow, according to the *ketan* employed. *Brom* kept for several years is considered excellent by the natives, and is very intoxicating. *Saki* is the name of the kind of beer which the Japanese prepare from rice; it is tolerably clear, and not a little resembles wine, but has a very singular taste, and cannot be considered pleasant. It is drunk in every tavern, and at meals, as beer and wine are by Europeans; but before being drunk, it is always warmed in a common tea-kettle, from which it is poured into flat tea-cups, made of lacquered wood, and in this manner it is drunk warm, and in a very short time heats and inebriates, but the intoxication vanishes in a few minutes, leaving behind a disagreeable headache. There are different sorts of wines made from rice by the Chinese, which are yellow, red, white, or pale colour. The most highly esteemed is that called "mandarin." This wine is so strong, that it will keep for a great many years, or, as some say, for ages. Within the empire it is principally consumed among the higher orders, who can afford to buy it, and when exported it sells very dear. This wine is considered exceedingly wholesome. Some of the rice wines are so highly perfumed, and so odoriferous, that on opening a bottle, the air of an apartment becomes quite fragrant. The lees are distilled, and yield a strong and agreeable kind of spirit, like brandy, which is called *shou-choo*, *sau-tchou*, *sam-tchoo*, and *sam-su*. The straw of rice serves to make straw-plait for women's bonnets.

It has been already stated that there are several varieties of Rice. The best is that grown in Carolina; it is larger and better tasted than that of India, which is small and meagre. *Oryza precox*, *O. mutica*, or *Mountain Rice*, which is cultivated in Cochin China and in Java, and *O. glutinosa*, are the representatives of the many varieties. *Zizania aquatica*, or *Canada Rice*, grows on the margins of ponds and marshy places, and is exceedingly prolific of bland, farinaceous seeds, which afford very good meal. It abounds in all the shallow streams of north-west America, where its seeds contribute essentially to the support of the wandering tribes of Indians, and feed immense flocks of wild swans, geese, and other water-fowl. Pinkerton says this plant is designed by nature to become the bread-corn of the north.

Phalaræe.—*Maize*, or *Indian Corn* (*Zea mays*), is not less a staple article of food, than rice to the inhabitants of warm countries. Considerable doubt exists as to the native country of maize; some say it was introduced to Europe from the West Indies and the continent of America, while others assert it is indigenous to Africa and India. Humboldt is of the former opinion; but, the plant being represented in an ancient Chinese encyclopædia, in the royal library at Paris, and the seeds being found in cellars of houses in ancient Athens, are facts so incontestible that there can be no doubt that maize has, from a very early period, being cultivated both in the Old and New World. The name by which it was formerly known in this country was *Turkey Wheat*, because it was an article of trade from the East; but the name of Indian Corn only originated with the early settlers in America, who so named it from finding the plant cultivated by the Indians. There can be little doubt but that the opinion of Cobbett, as to maize being the "corn" of Scripture, is correct; and the arguments he produces in support of it are too evident to be easily set aside. The cultivation of maize is infinitely more extended than that of wheat, rye, or sorghum; a part of France, almost the whole of Southern Europe, a great part of the East and Africa, and almost the whole of North America, make it their principal food. It is subject to great variation, and the varieties that are cultivated are very numerous, but none of them have proved sufficiently hardy to admit of it ever becoming an agricultural crop in this country. There have been instances where a crop has been ripened in favourable seasons, but it is much too precarious to be relied upon. As an article of food, maize has been highly spoken of. According to some, men fed on it are stronger, bigger, and undergo more fatigue than those fed on rye, barley, or buckwheat; women are better constitutioned, nurses have more milk, and children are more healthily reared. According to analysis, it is composed of 77 per cent of starch; 3 of a principle analogous to gluten, called *zein*; 2.5 of albumen; 1.45 of sugar; 0.8 of extractive; 1.75 of gum; 1.5 of sulphate and phosphate of lime; 3 of lignin, and 9 of water. In America the green ears are eaten roasted or boiled; and it is as common to hear the winter evening cry of "hot corn," in the towns of the United States, as the well-known muffin-bell in those of England. The starch is separated, and used as arrow-root, of which a good deal has of late years been imported to this country, under the name of *Oswego Arrow-root*. It is wholesome and nutritious, well adapted for making puddings, custards, and blanchmange, is easy of digestion, and, from the personal experience we have had of it, during a period of seven years, we see no reason why

it should not become an important article of commerce. With the fermented seeds a sort of beer is made, called *pito* in the Côte d'or, *chico* in Chili, and *poso* in the Bay of Campeachy; from this alcohol and vinegar may be obtained, as from other cereals. The spikes of the fertile flowers are frequently gathered in France and Germany, and pickled in the same way as girkin cucumbers. The small young stalks of thickly-sown crops are cut from time to time by the Mexicans, and served as desserts, in the manner of asparagus, in order that they may yield a thin sweet juice to the mouth when chewed. The full-grown, but completely succulent stems, are pressed like the sugar-cane, for the thin sweet juice they yield in great abundance; this juice is either fermented and distilled, so as to furnish an excellent spirit, or boiled in an unfermented state into a pleasant syrup.

Cnix lachryma is a tall-growing Indian grass, rising to eight feet high, with the strong habit of maize. The seeds are the size of large peas, of the shape of a dropping tear, and hence the plant is called *Job's Tears*; they are of a blueish-white colour, smooth and shining, like pearls, and are used to form bracelets and necklaces; reduced to flour, they are said to be nutritive and strengthening, and that, during periods of scarcity in Portugal and Spain, where the plant is almost naturalised, they serve as an article of food. The *Canary Grass* (*Phalaris canariensis*) is a native of the Canary islands, where it is cultivated for food by the inhabitants. The seeds contain a great quantity of amylaceous farina, which is very nutritive, and in some places is mixed with wheaten flour, and made into bread. They form the principal food of Canary birds, and other feathered pets of the household. It is extensively cultivated in the isle of Thanet, and round Sandwich in Kent. *Digraphis* (*Phalaris*) *arundinacea* grows abundantly in Britain, in ditches, pools, and by the margins of rivers, and called *Reed Canary-grass*. It generally grows to the height of from three to six feet, and produces a great weight of herbage; but cattle generally refuse it in its growing or green state, yet eat it readily when made into hay, or cut up and mixed with other food. Linnæus states that, in the province of Scandia, it is mown twice a-year, and cattle eat it; but it is of a hard texture, and they are not fond of it. The straw is used to thatch ricks and cottages, and lasts much longer than the straw of wheat. There is a variegated variety of this species, having the leaves banded with broad stripes of white and green, which is grown in gardens as an ornamental plant; it is called *Ribbon-grass*, *Ladies' Traces*, *Ladies' Laces*, and *Gardeners' Garters*.

Panicæ.—*Paspalum exile*, is a native of Sierra Leone, where it is cultivated by the people of the Loosoo, Foulah, Bassa, and Joloff nations, for its small seeds, and called *Fundi*, or *Fundungi*, which signifies *Hungry rice*. The grain is delicious, nutritive, and wholesome, and is prepared for food by the natives, by first throwing it into boiling water, then pouring the water off, and adding palm oil, butter, or milk; but the Europeans and negroes connected with the colony stew it with fowl, fish, or mutton, adding a small piece of salt pork for the sake of flavour. The grain is also made into puddings, with the usual condiments, and eaten either hot or cold with milk; the Scotch residents sometimes dress it as milk porridge. It forms light and delicate food, and if cultivated and exported to Europe in quantity, would no doubt become an important article of consumption

by those of weak digestion and convalescents. *P. frumentaceum*, called *varangon* in India, produces seeds, that are eaten like rice in Pondicherry, after the husks have been removed, and the plant is valuable because it grows in dry soils. *P. ciliatum*, a native of Surinam, is remarkable for being a useful remedy in jaundice. *P. scrobiculatum*, a native of India, where it is called *Menya*, or *Hureek*, is said to be poisonous, and to render the milk of cows that graze upon it narcotic and drastic; and the seeds when eaten cause vertigo; hence one of the native names, from *mana*, signifying phrensy. *Milium nigricans* is a native of Peru, where it is called *Maize de Guinea*. The seeds, after being dried by heat, yield a very white farina, which is both eaten as food and converted into a drink called *ullpu*. The *Common Millet* (*Panicum miliaceum*) is a native of India and Africa, but is now cultivated extensively in Southern Europe, and the Southern States of North America. In Java it is called *Jawa-wut*, and in India *Warree* and *Rade-kane*. The seed is very small, the size of a large pin's head, white, and very glossy; but, though small, it is an important article of human food, particularly in Africa, where, with sorghum, it is the principal support of the negro population; in India it is chiefly used in a kind of soup or bouillie, and made into cakes. There are several varieties of this, distinguished by grey, white, red, and black seeds. *P. maximum*, or *Guinea Grass*, is a native of Guinea and Senegal, but introduced at an early period to the West Indies, where it is extensively cultivated, and forms, by the abundance, and excellence of its forage, the most important pasture in Jamaica. *Italian Millet* (*Setaria italica*) was brought originally from India, where it is called *Kungoo*, in Bengal, or *Kora-kang*; and is now cultivated in the warm parts of Southern Europe, as an article of food for the poor population. The plant is most prolific in its produce, one spike yielding as much as two ounces of seed, and it will grow in the poorest sandy soils; one stem produces many stalks, and its produce is estimated at from five to ten times more than that of wheat. The seeds are small, round, and white, enveloped in a thin pellucid skin, which is very easily removed; in some parts of the south of France, Italy, and Spain, they are largely consumed by the poor, who boil them along with vegetables, a piece of butter or lard, seasoned with salt and pepper, and thus make an acceptable meal; it is alimentary in this form, but makes a heavy and disagreeable bread. *German Millet* (*S. germanica*) was formerly grown in Germany as a bread corn, but its use in this way has been long discontinued; it is largely grown in Hungary as green food for cattle, and particularly for horses, who prefer it to all other grasses. The Common Italian and German Millet-seeds are imported to this country in considerable quantity, and are mostly used as bird-seeds. *Pencilluria spicata* is grown in India as a bread corn, and is called *Bajree*.

Stipeæ.—The beautiful *Feather Grass* (*Stipa pennata*), cultivated in gardens as an ornamental plant, grows wild on the continent, in rocky places; and, although it has been found in this country out of gardens, it is doubtful whether it is really wild. Its beauty consists in the long feathered awns, which are sometimes a foot in length. They act as a hygrometer, turning in one direction by the influence of the humidity in the atmosphere, and in the contrary direction as the air becomes drier. These feathery awns assist, not only in distributing the seed, which is

carried by the wind to great distances, but by its construction to fix the seed in the soil. "When a seed with its feathered arrow alights on the ground, it enters the soil vertically, and in a few hours the base and sulcated part of the awn become twisted, and the feathery portion becomes horizontal, in consequence of which it is blown round by the autumn winds like a vane, and every turn screws it farther down into the earth,—for the hollows and ridges which, when it remained upon the plain, were only longitudinal sulci, have now given rise to the hollows and elevations,—in a word, to the threads of a screw. Thus it is moved down, and whatever is gained is prevented from being undone by a reverse motion of the vane, in consequence of the stiff hairs upon the glume, which act as barbs." The feathered awns are generally gathered and preserved as chimney-piece-ornaments, and when collected in bundles, resemble the tail of the bird of paradise. *S. tenacissima* is much used in Spain for making cordage, mats, and sandals, which are superior to those made of *Lygeum spartum*, because the latter is more brittle; this is supposed to be the *Spartum* of the Romans. *S. tortilis*, a native of the East and Barbary, frequently causes serious injury to sheep. The seeds, carried about by the wind, sometimes lodge on the back of a sheep, and, by their bristles, insinuate themselves through the wool and the skin, penetrating the flesh, even to the intestines, causing great pain, sleeplessness, loss of appetite, inflammation, and death. Several other species act in the same way; and it is on record that many cattle have died in Hungary from the same cause.

Arundæ.—*Ammophila arundinacea*, or, as it was formerly called, *Arundo arenaria*, is the *Sea Reed*, *Mat-grass*, or *Marram*. The great value of this plant consists in its creeping root-stocks, which so bind and mat the sands and sand-banks along our shores, as to enable them to oppose the inroads of the sea. For this purpose the plant is much grown in Norfolk and other parts of the coast of Britain, where encroachments have taken place. So important was the preservation of Marram considered, that an act of parliament was passed, in 1742, for its preservation on the north-west coast of England; and so strictly do these plants continue protected by law, that they may not be anywhere cut on the coast, by even the proprietors of the soil, except by such parties as claim prescriptive right of cutting it on the coasts of Cumberland; and at a much earlier date a similar act was passed in the Scottish Parliament, for the preservation of this and of *Elymus arenarius*. It is used for thatch, mats, ropes, hats, and several other purposes; yet, though it contains a large proportion of saccharine matter, it is quite unsuited for cultivation as food; the stems yield a fibre equal in strength to flax, but it is short and in small quantity. *Phragmites communis* (*Arundo phragmites*) is the *Common Reed* of our ditches and river sides, extending sometimes to marshy places and alluvial soils on the banks of rivers, where it is a troublesome weed. It is well adapted for binding river banks and water-walls, from the readiness with which its long, creeping, and matting root-stocks penetrate into the soil. In some parts of Europe the panicles of the flowers are made into light brooms, before they are fully expanded. The stems form an excellent and durable thatch; they serve for ceilings to cottages, and foundations to mortar floors; and they are extensively used by gardeners on the continent, and also in this country, to form screens to protect tender plants from cutting winds, and to make

mats for covering hotbed frames; the flowers are said to yield a green dye. The roots had formerly a great reputation in syphilis and rheumatism, and as a substitute for sarsaparilla. It was at one time used in the military hospitals in France, but entirely without any effect; it was also considered useful in dropsy. *Arundo donax* grows in the South of Europe in humid places, to the height of twelve or fifteen feet. Its roots, when young, have a sugary taste, but are insipid when old, particularly when dried. They are cut up in thin slices and used in decoction by nurses, to drive away the milk, when they wish to discontinue nursing. The analysis of the root, by Chevalier, showed it to contain a bitter, resinous, aromatic matter, analogous to that which is obtained from Vanilla. The young shoots are eaten as asparagus. The ripe woody stems are used for fences and vine supports in Italy and the South of France, and also for fishing-rods; they are imported to this country for weavers' reeds and fishing-rods. The stalks of *A. karka*, a native of India, are made into chairs, and the flower-stalks are beaten to form *Moonyah fibre*, which is made into twine and cordage. The beautiful *Pampas Grass* is *Cyperium argenteum*, a noble grass, throwing out leaves six or eight feet long, which rise from the root in an oblique direction, and hang over gracefully at the ends. The stalks are from ten to fourteen feet high, and the panicles of flowers eighteen inches to two feet long, like a plume of silvery feathers. This is now cultivated in this country, as an ornamental plant in flower-gardens and shrubberies, and some idea may be formed of its general appearance from the figure given at page 809, which, however, was taken from a small plant. A decoction of the root of *G. parviflorum* is used in Brazil to strengthen the hair; and *G. saccharoides*, also a Brazilian species, yields a quantity of sugar.

Chloreæ.—The roots of *Cynodon Dactylon*, called *Dog's-tooth Grass*, have been recommended as a substitute for sarsaparilla. The plant is rare in this country, but is abundant on the continent; and in India there is a variety of it, known by the name of *Doob*, *Doorba*, *Hurryalee*, which is the most common forage-plant of that country. According to Schomburgk, a decoction of *Eleusine indica* is administered to infants in Demarara against convulsions. *E. ægyptiaca* is an annual plant, growing abundantly in Egypt, where it is known by the name of *Nejim el Salib*. It is much employed by the natives, who make, with the seeds, a useful drink against diseases of the kidneys, the bladder, and against stone. The women administer the decoction of the roots to their children in small-pox, to restore the menses; some employ it against the marks that remain after the disease, and others use a decoction of the whole plant to cleanse the ulcers, and as a vulnerary. *Spartina striata*, or *Cord Grass*, is a native of Britain, in salt marshes on the east and south coasts. It has a stiff, rigid habit of growth, unlike any other grass, and is hard and tough, wherefore it has been converted into ropes. The *Rushy Cord-grass* (*S. juncea*) is a native of North America, and contains a good deal of fibre, which is fine, strong, and as soft as that of flax, but not so long. It has been recommended for cultivation on soils too poor and light to produce corn or flax.

Aveneæ.—*Hierochloa borealis*, called *Holy-grass*, is found in some parts of this country, but particularly in the highlands of Scotland, but it is rare.

It has a smell resembling Sweet Vernal-grass; and in Scotland it is so plentiful that the inhabitants scent their apartments and clothes with it. In some parts of the continent it is strewed on the floors of places of worship on certain festival days, and hence the origin of the name. *Sweet Vernal-grass* (*Anthoxanthum odoratum*) is abundant in this country, and is said to be the grass which communicates the odour to hay. It was with Linnæus that this statement originated, which is invariably repeated in books, but I have seen large quantities of the finest hay that comes into the London market entirely destitute of this grass, and at the same time preserve the fine hay scent. I have given particular attention to this subject, and I can affirm that some of the finest loads of hay in the London markets have not a trace of Sweet Vernal-grass in them. That this plant yields an odour, however, is quite true, and it communicates a sweet scent to linen if kept in drawers; and this is due to the presence of free benzoic acid. The plant is said to be tonic and cordial; it yields, by distillation, an essential oil, of an agreeable odour, which may be used as a mild aromatic and stimulant.

The *Cultivated Oat* (*Avena sativa*) is another of the Grasses that performs no small part in the economy of creation. It is supposed to be originally from Asia, but it is now spread over the whole of the temperate regions, where it is cultivated chiefly as food for horses; but in those parts where wheat is produced in limited quantity, it forms the staple article of food to man. The varieties of the cultivated Oat are very numerous, and their qualifications consist in their adaptability to different soils and climates, and in their productiveness; but this is not the place to treat either of the varieties or their cultivation. The grain of oats was formerly consumed to a great extent by the population of the north of England, Wales, and Scotland; but in many parts it is of late years giving place to wheat. This is to be regretted, and the more so because it arises from a false notion of refinement, and from an idea engendered by those who know no better, that oatmeal is a vulgar diet and fit only for the inferior animals. All facts go to show that it is peculiarly adapted to human food, and, more than any other grain, contributes to the building up of a healthy and sturdy population. The Highlanders of Scotland, and the lowland peasantry, whose subsistence depends wholly, or almost wholly, on oatmeal, are living testimonies, not only of the muscular and bony frames, but of the clear and vigorous intellects which may be fostered under such a regimen. M. Chevalier considered that the fecula extracted from oatmeal had some resemblance to arrowroot, and it has been by some put in comparison with it. According to the analysis of Professor J. P. Norton, of America, the grain of oats contains 65·11 per cent. of starch; 2·24 of sugar; 2·23 of gum; 6·55 of oil; 16·51 of a nitrogenous body analogous to casein, though differing from it in some respects; 1·42 of albumen; 1·68 of gluten; 2·17 of epidermis, and 2·09 of alkaline salts; with allowance for loss and error. At one time, in Scotland, oats were largely employed by the maltster and distiller, broken down with unmalted barley and a certain proportion of malt, under the pretext of keeping the malt and barley so open or pervious, as to give out the whole soluble parts of the broken grain and malt to the hot water in the mash-tun. The kernels, or grain, of the Oat deprived of the husks (paleæ) are called *Groats*, or *Grits*, and they were formerly used entire in broths and soups like pot-barley; but bruised they are employed

in making gruels and decoctions to serve as demulcents during sickness of any kind. The thin pellicles, or inner scales (squamulæ, or lodiculæ), which adhere to the groats during the process of shelling, are called "seeds," and with these a peculiar jelly-like food is prepared in Scotland, called *Sowens*; this is a nourishing aliment, and to weak and delicate stomachs has all the excellence of arrow-root. The straw of the oat makes good fodder for cattle and horses, particularly when chopped and mixed along with other food. The chaff is of little value, but serves as a manure mixed along with other fertilisers, and is generally used for stuffing beds, for which it is well-adapted. The seeds of *A. sterilis*, or *Animal Oat*, is like a large fly, and is furnished with a long, jointed, twisted awn, which is so sensitive to drought and moisture, that if a quantity of the seeds be subjected to either influence they will become a moving mass like as many insects. The awn makes an excellent homely hygrometer.

Festuceæ.—*Poa abyssinica* is called *Teff* in Abyssinia, and its seeds are employed as a bread corn; with the flour the inhabitants make bread, which is slightly acid, but agreeable and easy of digestion. A kind of beer is made by putting slices of this bread into warm water, the temperature of which is kept up in a close vessel for several days. The *Dab*, or *Koosha*, of India is *Poa cynosuroides*, and is held sacred by the Hindoos. It is made into ropes. The seeds of *Glyceria* (*Poa*) *fluitans*, called *Flote Fescue*, or *Floating Meadow-Grass*, constitute *Poland Manna*, or *Manna Croup*. The plant grows in great abundance in ditches and stagnant waters in this country, particularly in such situations as the Isle of Ely, Lincolnshire Fens, and other such low-lying, marshy places. When the seeds are ripe, the ear of the Flote Fescue is covered with a clamminess, which tastes like honey, and for this reason they are called *Manna Seeds*. These seeds are gathered annually in Poland, and exported to Germany and Sweden, where they are ground into flour, which is used by the upper-classes of society for cakes, or boiled in milk, forming an excellent dish, and highly appreciated on account of its nutritious properties and agreeable taste; it is used in this country as a wholesome food for infants. The seeds constitute the principal food of some of the finest fresh-water fish, and of many species of water fowl. Linnæus says, the husks of this grass will cure horses of the botts, if kept several hours from drinking. The plant produces a great abundance of herbage, so much so, that mowers are obliged to make two swarths or a double cutting of it; the stalks are long, thick, succulent, and very sweet. Cattle soon grow fat with it, and horses, when they eat of it, froth at the mouth with its delicious juiciness. *Molina cærulea* is worthless for pasture or hay; but is used by the peasantry in some parts of England for making brooms, and by the fishermen of Orkney and Shetland for making net-ropes, and might possibly be advantageously employed by straw-hat manufacturers for making straw-plait. *Tussac Grass* (*Dactylis cæspitosa*), a native of the Falkland Islands, has of late years been cultivated in the Highlands and islands of Scotland as an herbage plant, and particularly on peat soils near the sea, which seems to be the situation best adapted for it. The plant forms dense masses of stems, which frequently rise to the height of four or six feet, and the long, tapering leaves hang gracefully over in curves, from five to eight feet long and an inch broad at the base. The plant produces an abundance of herbage, which is highly relished by cattle,

and contains a great deal of nutritious, saccharine matter. The inner portion of the stem, a little way above the root, is soft, crisp, flavoured like a hazel-nut, and is often eaten by the inhabitants of the Falkland Isles; the young shoots are boiled and eaten as asparagus. *Festuca quadridentata*, a native of Peru, where it is called *Pigouil*, is poisonous to cattle, and it is used by the inhabitants for thatching. *Bromus catharticus*, a native of Chili, has a large root, a decoction of which is used in the country as a purgative; it is of a yellowish green colour internally, and has a pricking, but not disagreeable taste. *Bromus purgans* is said to be purgative and emetic, but this statement requires confirmation. The seed of *Bromus secalinus* was reputed poisonous, and that of *B. mollis* injurious, but experiments have proved these statements to be unfounded. Dr. Cordier took a drachm and a half of the flour of the former without experiencing the slightest inconvenience. With the internodes of *Arundinaria Schomburgki*, which are sometimes sixteen feet long, the Indians of Esmeralda form the tubes whence they blow the arrows poisoned with the deadly Urari, or Woorari.

The Princes among the Grasses are the Bamboos. *Bambusa arundinaria*, or *Common Bamboo*, is spread over the whole of the tropics of Asia, where it springs up naturally in great abundance, growing from fifty to sixty feet high. The stem is woody, hollow, simple, and shining, with internodes a foot in length, and as much in circumference in the largest canes. The uses to which the bamboo is applied are of a most varied description; it serves for house-building, for which it is very suitable, Dr. P. Brown having stated that dwellings built by the Spaniards in Jamaica were yet strong and perfect, after having stood a hundred years. In India, China, Japan, Cochinchina, and, in fact, the whole of the East, it is employed in house-building bridge-building, as masts for boats, ladders, rails, fences, spear-shafts, bows, fishing-rods, domestic utensils and furniture, agricultural implements, and, in short, for almost every purpose to which wood can be applied; the hollow tubes serve as conduits for water, and when split it is made into baskets, mats, and screens. With the pellicle, or bark, paper is made, by bruising and steeping it in water, and thus forming it into a paste. The young shoots of bamboo, when small and tender, are generally eaten in the same manner as asparagus, or boiled with milk, or made into broth with animal food, spices, salt, and water; along with the young root-stocks, they are pickled in vinegar throughout the whole of India, China, and Japan, and form the Eastern condiment brought to this country under the name of *achiar*, *achar*, or *atchar*. The pith is sugary, and it appears that a sugary juice flows from it, which becomes concrete on exposure to the sun, and is used for economical purposes in India. In the cavities or tubular parts of the bamboo is found, at certain seasons, a concrete white substance called *Tabasheer*, *Tabachir*, or *Tabaxir*, an article which the Arabian physicians hold in high estimation. It is commonly found in what are called the female, or large, bamboos, and those which contain this concrete are found on shaking to contain a fluid, which after some time gradually lessens, and then they are opened in order to extract the *Tabasheer*. The nature of this substance is indestructibility by fire; its total resistance to acid; its uniting by fusion with alkalies, in certain proportions, into a white, opaque mass; into a transparent, permanent glass;

and its being again separable from these compounds, entirely unchanged by acids. This substance the Hindoos consider as a powerful tonic, and attribute to it great efficacy in contusions and hemorrhages; the Persians employ it as a cordial and corroborant; analysed by Vauquelin, he found it composed of 70 parts of silica, and 30 of potash and chalk. The *Guada Bamboo* (*B. guada*) is a native of South America, particularly in the mountain of Quindu, where it frequently attains the height of sixty-five to a hundred feet; it forms forests of many leagues in extent, and appears to delight in elevated situations which offer a mild temperature; it descends into the very hot valleys, but is never seen on the very high mountains. For all purposes it is used in South America as the common bamboo is in the East. The internodes (spaces between the joints) of the stem are filled with clear water, which has an agreeable taste, and, though containing traces of sulphates and chlorides, cannot be distinguished from the purest water of springs, and affords a convenient and most grateful supply to travellers. *B. latifolia* has all the properties of *B. guada*, and is a native of the same countries.

Hordeæ.—Though one of the smallest in the number of genera, this tribe contains more plants valuable for their products than any other of the family. *Rye-grass* (*Lolium perenne*) is one of the most valuable grasses to the farmer, and forms an important constituent of all pastures; but another of the same genus, *L. temulentum*, or *Darnel*, is a sad exception to this generally beneficent family. Darnel is a common weed in many parts of Britain, infesting corn-fields, and shedding its seeds among the wheat, from which it is with difficulty separated. Some doubts have been expressed relative to the deleterious properties of the seeds of this plant, but there is sufficient evidence on record to show that the opinion held respecting it, from the time of Virgil to the present day, is a correct one. Some of the most eminent toxicologists have given their attention to the subject, and are general in their condemnation of it as dangerous to human life. On the continent it is particularly abundant in cultivated grounds, and in some seasons whole crops of wheat abound with its seeds. It is said to be particularly in wet seasons that the dangerous properties are most marked; a man who eat of bread made with four-fifths of darnel died the fourth day. Introduced into wheat flour in the proportion of one-ninth, it checks the panary fermentation. M. Sarazin, who has observed its poisonous action, states that its symptoms are vertigo, dimness of vision, headache, a sort of drowsiness and stupor. Beer in which it was introduced had the same effect. It has been proved, however, that though darnel acts as a narcotic poison on man, dogs, sheep, the horse, and fish, it is not injurious to pigs, cows, ducks, and poultry; it has been known even to fatten capons and fowls. The deleterious principle appears to be volatile, for the most dangerous preparation is the distilled water of the fermented grain; warm bread made with it is most dangerous, and its vapour is sufficient to produce intoxication; the unfermented bread is not deleterious, and wheaten bread is only injurious when mixed with one-fourth of darnel. It is said that the Turks mix darnel with their opium.

The numerous varieties of cultivated wheat have been ascribed in their origin to a plant called by botanists *Triticum sativum*, the normal, or wild form of which had never been discovered, and its native country never

known. Tradition had always asserted that it was a transformed weed, and Galen states that he and his father had observed that wheat degenerated into *Ægilops*. These notions were always looked upon as having no foundation, till 1852, when Professor Dunal, of Montpelier, gave to the world the result of the experiments of M. Esprit Fabre, of Agde. In Sicily and the south of Europe there grows a wild grass, known to botanists by the name of *Ægilops ovata*; this plant has a tendency to assume another form, under which it is called *Æ. triticoides*. M. Fabre selected seeds of the latter form; in 1839 he sowed them, and found among the plants a disposition to still further transformation, and such as exhibited this tendency he again selected, sowing in the following year the seeds they produced. He continued this mode of selecting and sowing for successive years, and every year found the produce assuming a closer resemblance to the cultivated wheat, till the twelfth season of his labours, when, to his satisfaction, he obtained the form of the plant which is now regarded, in temperate climates, as yielding "the staff of life." Wheat, then, is a plant produced by human skill, after man began to cultivate the soil, and abandon living on roots and masts, and is, therefore, the result and evidence of a higher civilisation.

The flour of wheat consists of starch, gluten, albumen, saccharine matter, and gum. According to the analysis of Vauquelin, it contains 10.25 per cent. of water; 10.80 of gluten; 68.08 of starch; 5.61 of sugar; and 4.11 of gum. *Starch* is obtained from many other substances, but more especially from the cereals; and the starch of commerce is procured chiefly from wheat, rice, and not unfrequently from potatoes. It is insoluble in alcohol, ether, and cold water, but unites with boiling water, which, on cooling, forms with it a soft, semitransparent paste, or a gelatinous opale solution, according to the proportion of starch employed. The paste placed on folds of blotting-paper, renewed as they become wet, abandons its water, contracts, and assumes the appearance of horn. Exposed, in a dry state, to a temperature somewhat above 212° , it undergoes, according to Caventou, a modification; and a degree of heat sufficient to roast it slightly, converts it into a substance soluble in cold water, called *British Gum*, and applicable to the same purposes as gum in the arts. The granules of starch consists of a thin exterior coating called *amylin*, and of an interior substance called *amidin*; the former is wholly insoluble in cold or boiling water, or alcohol, but the latter is soluble in water. *Gluten* is the soft, viscid, fibrous mass which remains, when wheat flour is washed under a stream of water, and at the same time worked with the fingers till the water comes away perfectly colourless. But this consists of two substances, one of which is soluble in alcohol, and the other insoluble; the former is called *pure gluten*, or *vegetable fibrin*, and the other *vegetable albumen*. Pure gluten is a pale, yellow, adhesive, elastic substance, which becomes of a deeper yellow and translucent by drying. It is almost insoluble in water, and quite insoluble in ether, and in the fixed and volatile oils; but it is soluble in hot or cold alcohol, the dilute acids, and in caustic alkaline solutions. Vegetable albumen is destitute of adhesiveness, and, when dry, is opaque, and of a white, grey, or brown colour; before coagulation it is soluble in water and insoluble in alcohol, but it coagulates by heat, and is then insoluble in water. It is associated with gluten in most of the farinaceous grains; is a constituent of all the seeds that form a milky emulsion with water, and exists

in all the vegetable juices that coagulate by heat. The mixture of vegetable fibre and vegetable albumen which constitutes gluten, by the aid of a moderate heat, converts starch partly into gum and partly into sugar; and it is by this action that, in the germination of seeds and the formation of malt, the production of saccharine matter is accounted for.

All animals eat the grain of wheat with avidity, but it is not to all alike wholesome: to the horse it is injurious. It is to the human family that it is essentially adapted, and for them it was evidently intended. It would be fruitless to enumerate the many uses to which it is applied; bread, biscuit, and pastry are forms familiar to all; and by the Italians it is converted into a paste, which is made into *maccaroni*, *vermicelli*, and *semolino*; but there is another article met with in commerce called *semolina*, which is in the form of small grains or granules, and is the hard parts of wheat, left unground after passing through the mill. *Soojee* is rough-ground Indian wheat. Alcohol is obtained from wheat by distillation. The straw, as is well known, is plaited to make women's bonnets.

There is a variety of the cultivated wheat called *Barbary Wheat* (*Triticum S. durum*), the grain of which is long, of a horny substance, with scarcely any meal. Poiret says that the grain along the borders of Barbary and part of the Levant is hard and almost of the same substance with rice; that the little meal there is in the middle, though very white, produces a black heavy bread, difficult of digestion; they only use, therefore, the hard or horny part, which they reduce almost to the fineness of meal, when they would make bread; but when the Arabs prepare it for making their common dish called *Courcouson*, they only break it coarsely between two portable stones. This the Moors put into an earthen pan, pierced with small holes, and place it as a cover to the pot in which their meat is boiling, so that it is dressed by steam; it is eaten with a little broth, milk, butter, and honey. *Spelt* (*T. spelta*) is much cultivated in many of the southern countries of Europe, where its grain forms the principal food of the poorer inhabitants, particularly in Catalonia, Arragon, and in the northern and flat parts of Switzerland. Haller says that the flour is much whiter than that of common wheat, and contains a larger portion of the glutinous part in which the nutritious quality resides; but that bread made of it is drier, and very harsh when it is stale.

As a bread-corn, *Rye* (*Secale cereale*) holds a high rank among the nations of northern Europe, and, being of a hardy constitution, it grows in regions where wheat would perish; like almost all the important cereals, its native country is unknown. It has been thought by some to have originated in Crete, by others in the Levant, and by another class in Egypt. It would almost seem, from its hardy constitution, which enables it to be cultivated even to the edge of perpetual snow, and in regions where the subsoil is for ever frozen, that it was originally obtained from some such country. The grain of rye contains less bran and more flour than that of wheat. The flour is nutritious, and the bread that is made of it is of a dark colour, like gingerbread, close, cool, pasty, well-flavoured, with an agreeable odour, and keeps seven or eight days without becoming dry. It is not so nutritious as that of wheat, and is rather heavy, but strong stomachs succeed in digesting it, and where it can without inconvenience be used, it has the property of stimulating the action of the bowels. It is stated by M. Courhaut, that

people who live exclusively on rye grow freely till they are seven or eight years old, after which their growth is slow till the age of twenty-two; during this time, he says, some are affected with leanness, scrofula, and obstructions, and in them puberty is not manifested till they are twenty-four years old; they are low in stature, but at the age of twenty or twenty-four they begin to grow, and become full-bodied and strong. The women of the latter age are as fresh and blooming as girls of fifteen or sixteen. It is said that dogs fed with the bread of rye are dull and sluggish, and are affected with running humours from the eyes; the uric acid of their urine is diminished, and albumen and mucus increased. By fermentation and distillation, a spirit is obtained from it, and it constitutes two-thirds of the grain from which *Hollands*, or *Geneva*, is distilled, the remaining third being malted barley, and the flavour is communicated by adding juniper-berries. Gathered before it is ripe, and dried, the grain is in some parts used as green peas. Dried and roasted when ripe, some mix it with coffee, or use it entirely as a substitute for that article. The flour of rye yielded, by the analysis of Einhoff, 3.27 of albumen, 9.48 of gluten, 11.19 of mucilage, 61.09 of starch, 3.27 of saccharine matter, 6.38 of lignin, and 5.42 of loss. The straw is very valuable for many purposes; it is extensively employed for straw-plait, in hat-making, mat-making, and in stuffing horses' collars; the stalks, if cut before they are ripe, are as tough as many fibrous substances, and are frequently used for tying and binding materials. Rye is subject to a disease called ergot, which is produced by a fungus, called by De Candolle *Sclerotium elavus*, and by Queckett *Ergotætia abortifaciens*. Grain thus affected is highly dangerous; even in the quantity of half a drachm or a drachm it often causes nausea and vomiting, and in still larger doses, produces a sense of pain and weight in the head, giddiness, dilatation of the pupils, delirium, and even stupor.

Barley is another of those valuable bread-corns, of the origin of which no certainty can be entertained. It is found in many varieties, two, four, or six-rowed. The two-rowed varieties are referred by botanists to what they call *Hordeum distichum*; those with four rows to *H. vulgare*; and those with six rows to *H. hexastichon*; but it is doubtful to what extent these are specifically distinct, and not merely well-marked varieties of the same normal form. The four-rowed sorts are generally considered as *Bear*, or *Big*, the common variety of which is extensively grown in the north of Scotland. The grain of barley makes a grey-coloured, close, cloggy bread, which dries much quicker than that made from Rye, and it is an article of food among the poor population of several countries of Europe, particularly in the mountainous districts, as in Switzerland, Sweden, and Scotland. Deprived of its husks, and polished and rounded in a mill, the grain forms what is called *Pearl* or *Pot Barley*; and, either whole or reduced to meal, it is used for fattening pigs, poultry, and cattle. In Spain, and among the Arabs, it is the principal food of the horse, for whom it is very suitable, as it serves both as a nourishing aliment for increasing flesh and improving his condition, and as an excellent spring physic for stimulating the intestines; but at first it must be given in small quantities, otherwise it will act as a smart purgative. The grain of barley contains, according to the analysis of Proust, 32 of starch, 3 of gluten, 5 of sugar, 4 of gum, 1 of yellow resin, and 55 of *hordein*. This is a principle closely analogous to lignin, and Berzelius suggests that it may be an intimate mixture

of vegetable fibre with gluten and starch, which are with difficulty separable, as they exist in this grain. It is obtained by first washing barley meal in cold, and afterwards in hot water, to free it from all its soluble ingredients; and it is to the presence of this substance, as much as to the almost absolute absence of gluten, that barley bread is so inferior and so indigestible.

But the chief use to which barley is applied is in the making of *malt*. The barley is wetted with water till it turns reddish, then spread one to two feet thick on a floor where it becomes heated, and germinates; it is then subjected to drying on a kiln. By this process the sugar, starch, and gum are increased in quantity, while the hordein is diminished, as is shown by the analysis of malt by Proust, who found in 100 parts 56 of starch, 1 of gluten, 15 of sugar, 15 of gum, 1 of yellow resin, and only 12 of hordein. Malt, as is well known, when mashed and fermented with water, with the addition of hops, constitutes *Beer*, *Ale*, and *Porter*; these several beverages being distinguished by strength of the liquor and the greater or less degree of drying to which the malt has been subjected. After malt has been fermented with water and distilled, the spirituous liquor called *Whisky* is obtained; and the marc, or "grains," as it is called, that remains after these processes, are given as food to milch cows, for increasing the quantity of the milk. A substance called *diatase* was discovered by Payen and Persoz in the seeds of barley, oats, and wheat, and in the potato, but in greatest quantity in barley. It is solid, white, tasteless, soluble in water and weak alcohol, but insoluble in concentrated alcohol. Though it has no action on gum or sugar, it has the extraordinary property, when mixed in the proportion of only one part to 2,000 with starch suspended in water, and maintained at a temperature of about 160°, of converting that principle into dextrine and the sugar of grapes. The other uses of barley are too well known to require notice here. The straw is of little value, either as fodder or as litter, but on account of its softness it is extensively used by wine-merchants and others as a packing material for bottles and delicate merchandise.

Rottboellæ.—After having treated at considerable length the Cereals, or bread-corn grasses, we come now to the consideration of those producing another and highly necessary product—namely, Sugar. The *Sugar Cane* (*Saccharum officinarum*) is a herbaceous plant, with a large, jointed, fleshy root-stock, which sends up several jointed, shining, solid stems, from one to two inches in diameter, and six to fourteen feet high, containing a white and juicy pith. The joints are about three inches apart, and from them arise the leaves, sheathing the stem up to the next joint, and then spreading out three or four feet long and an inch broad. The flowers are of a pink colour, surrounded by silky down, and grow in terminal panicles two or three feet in length; and the whole plant has the appearance of Indian-corn. It is generally allowed to be a native of India, but it grows over the whole of tropical Asia and Africa, and has been introduced to Italy, Spain, and the various countries in America, where it is now cultivated. It has undoubtedly been regarded with interest from a very high antiquity, for it is frequently depicted on some of the most ancient specimens of Chinese porcelain, much of which is supposed to have been made before the Christian era. According to Humboldt, the generic name is derived from *scharkara*, which in Sanscrit signifies hard, stony, from the consistence of the product

extracted from it; and from this the Hindoos have made *schaker*, and the Persians *sekukur*. The fresh cane is largely consumed by the Arabs, under the name of *kassab*. The plant was introduced from India to Arabia in the thirteenth century, thence through Syria and the Levant to Sicily in the fourteenth. Don Sebastian, the regent of Portugal, sent it to Madeira and the Canaries in the fifteenth century, and at a later period to St. Thomas in the West Indies, where, in 1520, they had not less than sixty manufactories. It is now spread over the whole of the West Indies, Brazil, and the Southern States of North America, and the quantity produced is now greater than what is obtained from the East Indies.

There are several varieties of the Sugar Cane. 1, The Common, with a yellow stem. 2, The Purple, with a purple stem and richer juice; this is what is called in India *Karambou kari*. 3, The Gigantic, with a very large, light-coloured stem, called in India *Karambou valli*; and 4, the Otaheitan, which was introduced from the island of Tahiti by Bougainville and Bligh, and is distinguished by its greater height, the longer intervals between its joints, and by the greater length of hairs which surround the flowers; by some this has been considered a species, and designated *S. violaceum*. The plants are cultivated by cuttings, which are planted in rows, and by throwing up fresh shoots, they furnish five or six crops before the plantation requires to be renewed. When a year old the plant generally flowers, and in four or five months afterwards the canes are completely ripe, and contain a sweet, viscid juice. They are now cut down close to the ground, their tops and leaves removed, and then crushed between three revolving cylinders, passing just between the bottom and middle cylinders, and then between the top and middle cylinders, by which operation the juice is expressed. The juice forms 90 per cent. of the cane; but only about fifty per cent. is obtained in practice. As soon as it runs from the mill it is used immediately, or it would ferment; it is received into suitable vessels, and without loss of time mixed with lime, in the form of milk of lime, in the proportion of about one part of earth to eight hundred of the juice, and heated in a boiler to 140°. The use of this alkaline earth is to neutralise the acetic acid, which exists ready formed in the woody parts of the cane, and is pressed out by the mill along with the juice, and to clear the juice from the foreign matters that are mixed with it. By the application of heat, the gluten and albumen rise to the top, and form a thick scum or cake on the surface of the liquid, which is drawn off from beneath by a stop-stock into a copper boiler, where, by successive boiling, it is concentrated into a thick syrup, the scum being carefully removed during the operation. When sufficiently thick, the syrup is removed into vessels called coolers, from which, before it cools, it is drawn off into wooden vessels with perforated bottoms, the holes in which are temporarily plugged. At the end of twenty-four hours, the liquid is strongly agitated with wooden stirrers, in order to accelerate the granulation of the sugar, which is completed in six hours. The stoppers are now removed, and the syrup is allowed to drain off from the sugar, which in this state is granular, of a yellowish colour, and moist; after being dried in the sun, and packed into hogsheads, it forms the *Brown* or *Muscovado sugar* of commerce. The syrup that was drained off is again evaporated, and furnishes an additional portion of sugar, and the liquid which finally remains, incapable of yielding more sugar, is called *molasses*.

or *treacle*. Eight pounds of the juice yield, on an average, one pound of brown sugar. Sometimes the brown sugar undergoes an additional preparation, by boiling it with lime water, and, after sufficient concentration, allowing the syrup to crystallise in large, inverted, conical moulds, with a hole at the apex which is plugged. The surface of the mass being covered with a mixture of thin clay and water, the plug is removed, and the water from the clay percolates the mass, and removes the coloured syrup which flows out at the hole. Sugar thus prepared, approaches a white state, and constitutes the *clayed sugars* of commerce. To make refined or loaf sugar, common muscovado is formed into a pap with hot water, and this is put into conical moulds, and allowed to drain from its coarse treacle and other substances; it is then mixed with a small quantity of lime-water, some bullock's blood, and a small quantity of animal chareoal, and heated by steam, admitted by various orifices, by which it is dissolved and incorporated with the albumen of the blood, and with the animal chareoal, the whole being formed into a mass. This is then subjected to various operations of separation and refining, till nothing but pure sugar remains, in the form of a limpid and highly clarified syrup, which is then evaporated and transferred to coolers, where it is agitated to cause it to granulate. In this state it is poured into unglazed earthenware moulds, of a conical shape, with a hole in the apex, which is stopped with a paper plug. The moulds are placed with the apex downwards, over stoneware pots, intended to receive the uncrystallisable syrup. When the mass is sufficiently conereted, the moulds are unstopped to allow the coloured syrup to drain off; and to remove the remains of this syrup the operation called "elaying" is performed. This consists in removing from the base of the loaf a layer of the sugar about an inch thick, and replacing it with pure sugar in powder, which is covered with a mixture of pipeclay and water, of about the consistence of cream; the water gradually leaves the clay, dissolves the pure sugar, and percolates the mass as a pure syrup, removing in its progress the coloured syrup, and it now constitutes pure sugar. The masses or loaves are, after a few days, placed in a stove heated to 130° or 140° , where they remain until they are baked hard; and are afterwards taken out of the moulds, and wrapped in purple paper ready for sale. Cane sugar is composed of carbon 12, hydrogen 11, and oxygen 11.

A spirit is distilled from the fermented juice of the cane, and is called *Taffia*. It is made from those plants that have received injuries in the field, the juice of which is already in a state of incipient fermentation; from the canes after they have been pressed; or from those that are too old or too young, and not calculated to yield much sugar. The juice requires to be twice distilled to procure the spirit of great strength; it has a disagreeable odour, and a harsh, bitterish flavour. *Rum* is distilled from molasses, the scum from the boilers, and other refuse from the preparation of sugar; these are mixed with six or eight times as much water, and left to ferment for seven or eight days, and afterwards two or three times distilled. This is much more mild and delicate than taffia, particularly when it is old, and carefully made. When concentrated syrup is gently heated, and spirit added to it, the liquid, on cooling, forms white, semi-transparent crystals, having the shape of oblique, four-sided prisms, and is called *sugarcandy*. When heated to 365° , sugar melts into a colourless liquid, which,

on being suddenly cooled, forms a mass called *barley-sugar*. The uses to which sugar, molasses, and the other forms of these substances are applied, are so familiar to every one, as to render it quite unnecessary to occupy space with an enumeration of them.

Anatherum muricatum is a large grass, growing in ditches, along the coast of India, in Amboyna, and Ceylon. It is called *vitti-vaer* in Malabar, and *lana*, or *khus* in Bengal. Its inodorous leaves and stems are used to cover boxes. Its insipid roots have a strong and agreeable perfume when dried; they are used in India to perfume clothes, and to make tattas, and the roofs of palanquins; the fragrance is lost by age, but may be partly renewed by sprinkling the root with water. The Indians employ the roots in a warm infusion against fevers and rheumatism, and as a sudorific and slight stimulant; it is also said to serve as a condiment and an aromatic. M. Vauquelin found the root to contain a colouring matter, soluble in water; a resinous matter, similar to myrrh; a free acid; calcareous salt; a great quantity of oxide of iron, and a large proportion of lignin. In India fans are made of the plant. *A. nardus*, also a native of India, is called *Ginger Grass*, because the plant has the taste of ginger. *Andropogon sorghum*, or *Sorghum vulgare* (*Indian Millet*, or *Guinea Corn*), is cultivated in India, China, and Africa for its seeds, which furnish a staple article of food to the inhabitants of those parts. The seed is called *Durra* by the Arabs, *Joar* and *Jowaree* by the Hindoos, and in the south of Europe, where it is also cultivated, *Sorgho* or *Sorghum*. In Italy it is used for feeding, horses, pigs, poultry, and pigeons. *A. (Sorghum) saccharatus* is a native of India, where it also is cultivated as a cereal, and it abounds in a sugared juice. This plant has recently been introduced to the United States, where it is called *Chinese Sugar Cane*, and is likely to become a new feature in American agriculture. It is so hardy as to grow from Florida to Maine, and produces an abundance of syrup to superior the best sugar refineries, and can be formed into dry sugar as easily as the syrup from the true sugar-cane. One grower states, that, on ordinary soil, he has obtained from 346 to 468 gallons of syrup to the acre, and that every farmer can make his own syrup at a cost not exceeding fifteen cents per gallon. In Illinois, a grower procured 384 gallons of syrup per acre, which he sold at one dollar a gallon. As a forage plant, cut while young, it is highly valuable and nutritious. *A. schœnanthus*, or *Lemon Grass*, is a native of India, and the plant is so called from having a strong lemon scent when rubbed between the fingers. In India, Europeans make an agreeable tea with the fresh leaves, which is considered stomachic, tonic, and useful in dyspepsia. The Javanese consider the plant aromatic and stimulant, and constantly use it; while in the Moluccas an essential oil of a pleasant taste is extracted from the leaves. From *A. warancusa* the celebrated *Grass Oil* of Nemaar is obtained, which is highly recommended in frictions against rheumatism; and is supposed to have much the same stimulant action internally and externally as cajeput oil. The oil is obtained from the grass by distillation; small bundles of the grass are placed in a boiler, covered with water, and distilled, and the oil that comes over is volatile, extremely pungent, of light straw colour, very transparent, with a peculiar, rich, and agreeable odour.

SUB-DIVISION III.—RHIZOGENS.

RHIZOGENS are an anomalous race of plants, forming a connecting link between the Flowering and Flowerless divisions of the Vegetable Kingdom, and partaking so much of the structure of both, that their position has been variously fixed by different botanists. Jussieu, Brown, Richard, and Ad. Brongniart class them among Exogens; Blume places them in the neighbourhood of Fungi; while Unger, Endlicher, and Lindley arrange them by themselves, between the Gramineæ and the Fern Allies. Like flowering plants generally, they have distinct floral envelopes, and sexual organs; but, in their cellular and fungoid structure, and the almost total absence of spiral vessels, they closely resemble Cryptogams. They are parasitical in their growth; have no proper stem or leaves; their seed appears to be composed of a homogenous mass of coarse, clustered grains, in which it is impossible or difficult to distinguish the structure of an embryo.

Rhizogens are described as being plants composed of a cellular structure, with few imperfect, scattered, often reticulately-connected bundles of scalariform vessels; parasitical on the roots or branches of other plants; sometimes with stems, and sometimes with a creeping, root-stock-like caudex, never furnished with an erect, simple, or branching stem. The leaves are scale-like, never green, destitute of stomata and vessels, very frequently imbricated. Flowers with the sexual organs either monœcious or diœcious, rarely combined in the same flower. Perianth either perfect, rudimentary, or wanting. The external integument of the seed is hard; nucleus cellular, filled with grumous corpuseules.

The three following orders are all that constitute this sub-division :

Order 250. RAFFLESIACEÆ.
251. CYTINACEÆ.

| Order 252. BALANAPHORACEÆ.

ORDER CCL.—RAFFLESIACEÆ—RAFFLESIA FAMILY.

PARASITICAL plants, without stems or leaves, being, in fact, mere

flowers, growing on the branches of trees. *Flowers* hermaphrodite, or unisexual by abortion. *Petricianth* superior, globular, or campanulate and five-lobed; the tube lined with fleshy bodies, which

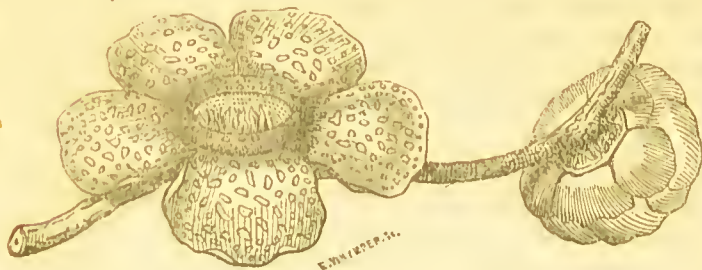


Fig. 228. *Rafflesia Arnoldi*.

are either distinct or united into a ring. *Stamens* united, forming a column (synema) which adheres to the tube of the perianth; anthers two-celled, either distinct and opening by vertical apertures, or united, so as to become a many-celled mass opening by pores. *Ovary* inferior, one-celled, with several marginal ovule-bearers, each covered with numerous pendulous ovules; styles equal in number with the ovule-bearers, conical, and united in the interior of the tube formed by the synema, but distinct beyond it. *Fruit* a berry, unopening. *Seeds* numerous.

GENERA AND SYNONYMES.

<i>Rafflesia</i> , B. Rr.	<i>Brugmansia</i> , Bl.	<i>Mycetanthus</i> , Rchb.	<i>Frostia</i> , Berter.
<i>Sapria</i> , Griff.	<i>Zippelia</i> , Rchb.	<i>Apodanthes</i> , Poit.	<i>Pilostyles</i> , Guill.

GEOGRAPHICAL DISTRIBUTION.—Some are found in the East Indies, growing on the roots of *Cissus*, that trail along the surface of the soil; and others are natives of South America, on the branches of Leguminous plants.

PROPERTIES AND USES.—These have all astringent properties. *Rafflesia Arnoldi* is one of the wonders of the vegetable kingdom. It has neither root, stem, nor leaves, but is simply an immense flower, three feet in diameter, and weighing about fifteen pounds. It is a native of Sumatra, where it grows close to the ground, on the roots of other plants. It is called by the natives *Krubut*, or the great flower, and *ambun-ambun*, wonder-wonder. *R. patma* is a native of Java, and is a powerful astringent, useful in uterine hemorrhages; *Brugmansia* possesses the same virtues.

ORDER CCLI.—CYTINACEÆ—CISTUS-RAPES.

THESE are root parasites, with hermaphrodite, monœcious, or diœcious flowers, which are either solitary and stemless, or set on the summit of a scaly stem, placed in the axil of bracts. The perianth is tubular, and three to six-lobed; anthers eight, sessile, two-celled, distinct, opening longitudinally. Ovary inferior, one-celled, with eight marginal ovule-bearers; style simple, cylindrical. Fruit a berry, one celled, containing a number of seeds embedded in the pulp.

GENERA AND SYNONYMES.

<i>Cytinus</i> , <i>L.</i>	<i>Hyobanche</i> , <i>Spar</i>	<i>Aphyteia</i> , <i>L.</i>	<i>Sarcosiphon</i> , <i>Bl.</i>
<i>Thyrsine</i> , <i>Gled.</i>	<i>Hypolepis</i> , <i>Pers.</i>	<i>Thysmia</i> , <i>Griff.</i>	<i>Ophiomeris</i> , <i>Miers.</i>
<i>Pheliypœa</i> , <i>Th.</i>	<i>Hydnora</i> , <i>Th.</i>		

Cytinus is a native of the South of Europe, where it grows on the roots of *Cistus*; the others are found at the Cape of Good Hope, and in Madagascar. *Cytinus hypocistis* is a small parasitical plant growing all over the South of Europe, from Spain to the Levant, on the roots of *Cistus*. When the whole plant is subjected to pressure, it yields a juice of which an extract is made by evaporation, known on the continent by the name of *Hypociste*, and which forms an article of commerce. This has an acrid taste, without bitterness or austerity, melts in the mouth, and contains gallic acid; it precipitates gelatine, although it is quite free of tannin. Bergius says it makes ink with sulphate of iron; its juice is reputed astringent and tonic, and is recommended in gonorrhœas, diarrhœas, dysentery, and hemorrhages. Pelletier and Caventou found it to be composed of a carbonised matter, insoluble in water and alcohol; a colouring matter, soluble in water, and another in alcohol, not precipitating gelatine; gallic acid; another matter, soluble in water, precipitating gelatine. *Hydnora africana*, called *Jackal's Kost* in Southern Africa, has the odour of a fungus, or of some decaying animal matter; and, when roasted, is eaten by the natives.

ORDER CCLII.—BALANOPHORACEÆ—BALANOPHORA FAMILY.

ROOT-parasites, without leaves, furnished with underground, fleshy, branched root-stocks or tubers, from which arise naked or scaly peduncles, bearing heads of unisexual, bracteate flowers, mixed with filaments. The male flowers are generally white, with a tubular three to five-lobed, or entire perianth. Stamens three to five, rarely one; anthers free, or united into a many-celled mass. In the female flowers the tube of the perianth adheres closely to the ovary, and its limb is either wanting or two-lipped, rarely six-leaved. Ovary one-celled, containing a pendulous ovule, which is a cellular nucleus; styles one to two. Fruit somewhat fleshy. Seed solitary, albuminous; embryo undivided.

GENERA AND SYNONYMES

Balanophora, <i>Forst.</i>	Icthyosma, <i>Schlet.</i>	Helosis, <i>Rich.</i>	? Rhopalocnemis,
Cynopsole, <i>Endl.</i>	Lophophytum,	Caldasias, <i>Mut.</i>	[<i>Jungk.</i>
Polyplethia, <i>Griff.</i>	[<i>Schott.</i>	Lathræophila,	Corynea, <i>Hook. f.</i>
Sarcocordylis,	Archimedeas <i>Lean</i>	[<i>Leand.</i>	Thonningia, <i>Schum</i>
[<i>Wall.</i>	Ombrophytum <i>P&E</i>	Langsdorffia, <i>Mart.</i>	Hæmatostrobos,
Cynomorium, <i>Mich.</i>	Lepidophytum,	Seybalium, <i>Schott.</i>	[<i>Endl.</i>
Sacophyte, <i>Sparrm.</i>	[<i>Hook. f.</i>	Phæocordylis, <i>Griff.</i>	

These are found throughout the tropics of the whole world, but nowhere in great abundance. They are most plentiful in Asia and America. They all possess astringent properties. *Cynomorium coccineum*, called *Malta Mushroom* on the continent, from its habit of growth, is a parasitical plant, growing in Crete, Egypt, Sardinia, and Malta. Subjected to pressure, it yields a red, bitter, astringent juice, which has been recommended in hemorrhages, dysentery, and malignant ulcers. The plant also may be given in powder. Similar properties are attributed to Helosis in Jamaica. *Sarcophyte*, a native of the Cape, is said to have a most horrible odour, exceeding in nauseousness every other that can be imagined. The *Ombrophytinatives* of Peru, spring up after rain with wonderful celerity, like mushrooms, and are roasted and eaten like fungi by the natives, under the name of *Mays del monte*. *Lepidophytum* is also eaten in Bolivia; and Dr. Hooker states that the knots produced on the roots of maples by the Himalayan species, are turned into cups throughout Tibet.



DIVISION II.—FLOWERLESS PLANTS.—CRYPTOGAMS.

THESE have been styled by various botanists CRYPTOGAME, ACOTYLEDONEÆ, and VASCULARES. They embrace all those plants which have no apparent flowers, nor sexual organs, and include all the lowest forms of vegetable life, some of which are of a character so remarkable, as to render it difficult to distinguish whether they belong to the vegetable or to the animal kingdom.

Cryptogams are composed either entirely or nearly so of cellular tissue, that is, a congeries of vegetable cells, sometimes even a simple cell; and are, in many instances, to all appearance, nothing more than mere mucus or slime. They have no proper flowers, and therefore do not produce what are generally called seeds; their spores (or seeds) being simple cells destitute of an embryo. The difference between the Flowering and Flowerless Plants is, that in the former, reproduction takes place by means of a seed containing an embryo, and in the latter through a spore; and the distinction between the two is, that in the seed the embryo only germinates, while in the spore any portion of its tissue is capable of germination.

The Flowerless Plants, or Cryptogams, are arranged into two subdivisions—ACROGENS and THALLOGENS.

It is not our intention to enter so fully into the consideration of this part of the subject as we have done with the Flowering Plants, as they are, with some exceptions, subjects of little interest to the generality of people. Even those who know them best, are aware of the difficulties attending the study of them; and, as almost every family in this interesting division is now undergoing revision from the hands of some of the most eminent cryptogamic botanists, we shall not at present increase the bulk of our volume with views of a subject which must ere long become stale and antiquated, but content ourselves, and we trust our readers also, by giving an outline of their arrangement, and the uses to which some of the Cryptogams are applied.

SUB-DIVISION IV.—ACROGENS.

THESE have no primary root, and their growth is only in one direction—upwards; they have no power of increasing in diameter as they advance in age, but keep growing from the apex only. Some of them have true spiral vessels, but many are destitute of them, and all are furnished with true leaves and stems; the leaves are either veinless or have a forked venation. They embrace the following orders:—

Order 253. FILICES.

254. MARSILEACEÆ.

255. LYCOPODIACEÆ.

Order 256. EQUISETACEÆ.

257. MUSCI.

258. HEPATICEÆ.

ORDER CCLIII.—FILICES—FERNS.

HERBACEOUS perennials, with a root-stock, or an arborescent stem, from which arise *Leaves*, or *fronds*, sometimes simple, sometimes more or less deeply cut, pinnated, or compound; before expansion, they are generally coiled up like a erosier, but in a few cases their vernation is quite straight. On the veins of their lower surface, or along

their margins, the organs of fructification are situated; the spores are contained in spore-cases (*sporangia*, or *thecæ*), which are arranged in masses (*sori*) of a round, elongated, or kidney shape, and are either naked or covered by a membrane, or covering, called an *indusium*;

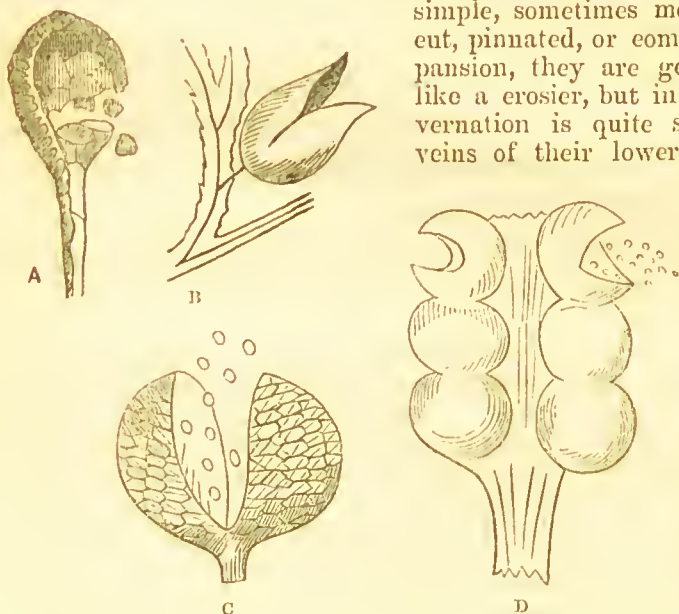


Fig. 229.—A, Spore-case of *Aspidium*; B, ditto of *Hymenophyllum Wilsoni*; C, ditto of *Osmunda*; D, ditto of *Ophiglossum*.

sometimes they are surrounded by an elastic ring, which is either vertical

or horizontal, and free, and they burst either at their circumference, or by a longitudinal slit, or irregularly.

SUB-ORDER I.—POLYPODACEÆ.

Fructification placed on the back or edge of the fronds; spore-cases with a vertical or excentric ring, sessile or stalked, and bursting transversely. Fronds simple or compound.

TRIBE 1. Polypodieæ.—Spore-cases stalked; ring vertical. Spores sub-globose or oblong.—EXAMPLES: *Acrostichum*, *L.*; *Gymnogramma*, *Desv.*; *Ceterach*, *Adans.*; *Polypodium*, *L.*; *Adiantum*, *L.*; *Pteris*, *L.*; *Allosurus*, *Bernh.*; *Blechnum*, *L.*; *Asplenium*, *L.*; *Scolopendrium*, *Sm.*; *Lastræa*, *Presl.*; *Aspidium*, *Swz.*; *Cystopteris*, *Bernh.*; *Woodsia*, *R. Br.*

TRIBE 2. Cyatheæ.—Spore-cases sometimes more or less elevated on a receptacle, but generally sessile; ring vertical. Spores three-cornered or three-lobed.—EXAMPLES: *Schizochlæna*, *J. Sm.*; *Alsophila*, *R. Br.*; *Cyathea*, *Sm.*

TRIBE 3. Parkeriæ.—Spore-cases thin and membrauous; ring broad, imperfect, sometimes wanting.—EXAMPLES: *Ceratopteris*, *Brong.*; *Parkeria*, *Hook.*

SUB-ORDER II.—HYMENOPHYLLÆ.

Spore-cases placed on a receptacle at the margin of the frond, and at the end of a vein, bursting irregularly; ring complete, horizontal. Spores convex or tetraëdral-pyramidal.—EXAMPLES: *Hymenophyllum*, *Smith.*; *Trichomanes*, *L.*

SUB-ORDER III.—GLEICHENIÆ.

Fructification placed on the back of the fronds, sessile. Spore-cases with a broad, striated, transverse, or somewhat oblique ring, bursting longitudinally, inwards. Spores oblong or kidney-shaped.—EXAMPLES: *Gleichenia*, *Smith.*; *Platzoma*, *R. Br.*

SUB-ORDER IV.—SCHIZÆÆ.

Fructification placed on the back of the fronds. Spore-cases sessile, with a vertical ring. Spores pyramidal or conical.—EXAMPLES: *Anemia*, *Swz.*; *Anemidictyon*, *J. Sm.*; *Schizæa*, *Smith.*

SUB-ORDER V.—OSMUNDEÆ.

Fructification either on the back of the frond or in panicles. Spore-cases stalked, thin, and membranous, with a broad dorsal ring, and bursting vertically. Spores oblong or somewhat globular.—EXAMPLES: *Osmunda*, *L.*; *Todea*, *W.*

SUB-ORDER VI.—DANÆACEÆ.

Fruetification on the back of the frond. Spore-cases without rings, sessile, distinct, or connate, bursting vertically or laterally. Spores ellipsoid.—EXAMPLES: *Kaulfussia*, *Bl.*; *Danæa*, *Smith*; *Marattia*, *Swz.*

SUB-ORDER VII.—OPHIOGLOSSÆ.

Fruetification on a spike. Spore-cases without rings, sessile, distinct, or connate. Spores like fine powder. Vernation of the fronds straight.—EXAMPLES:—*Ophioglossum*, *L.*; *Botrychium*, *Swz.*

Considered in their direct uses to man, Ferns are not of great importance, as they possess no properties of a very marked character. The leaves of a great number are mucilaginous, slightly aromatic, and astringent. The root-stocks of many species are bitter, more or less acrid, and are reckoned anthelmintic.

Adiantum capillus veneris, or *Maiden Hair*, is so named from being supposed to promote the growth of the hair. It is found in almost every part of the world, but is rare in this country. It is somewhat mucilaginous, and its odour and taste are slightly aromatic and agreeable; the infusion, sweetened with sugar or honey, is drunk in rheumatic affections and slight catarrhs. The *Syrup of Capillaire*, so much used on the continent, and admired for the sweet and agreeable aroma the plant communicates to it, is made by pouring simple boiling syrup on the leaves of maiden-hair. *A. pedatum*, a native of North America, has the same properties, and is sometimes used as a substitute. *Common Polypody* (*Polypodium vulgare*), or *Polypody of the Oak*, is very common in the clefts of old walls, in the hollows of old trunks of trees, and among rocks. The root-stock, which is used medicinally, has a disagreeable oleaginous odour, with a sweetish, somewhat bitter, and nauseous taste. It was considered purgative, and was employed against the bile, and as a pectoral in chronic catarrh and asthma, but it is not made use of in modern practice. *Male Polypody* (*P. filix mas*) is slightly tonic and astringent, and is considered by some a powerful remedy for the expulsion of the tape-worm. *Lady Fern*, or *Female Polypody* (*Althyrum filix femina*), is supposed to possess the same anthelmintic properties as the male fern. The root-stocks of *Osmunda regalis*, or *Royal Fern*, were formerly employed in a great number of diseases, particularly in scrofula. The leaves of *Scelopendrium vulgare* have been recommended in obstructions of the bowels, and those of *Ceterach officinarum* in asthma and catarrhal affections. The tubes of the pipes of the Brazilian negroes are made from the stalk of *Mertensia dichotoma*. The root-stocks of *Nephrodium esculentum* are eaten in Nepal, as are those of *Pteris esculenta* by the natives of Van Diemen's Land; they roast them in the ashes, peel off the skin with their teeth, and eat them with meat as we do bread.

ORDER CCLIV.—MARSILEACEÆ—PEPPERWORTS.

SMALL aquatic plants, fixed at the bottom, or floating on the surface, of the water. Leaves bristle-like or widened, sometimes composed of four leaflets on the summit of a long petiole. Organs of reproduction contained in leathery or membranous involucre, grouped or solitary, opening or not opening; they are of two sorts, regarded as male and female, sometimes enclosed in the same capsule-like involucre with several cells separated by longitudinal or transverse partitions, or each sort of organs is placed in particular involucre. The germinating body contained in a cellular envelope, a sort of nucleus or mass of utricular tissue, which is the true spore, and which has occasionally a mamilla on one side, whence roots and leaves proceed.—GENERA: *Pilularia*, *L.*; *Marsilea*, *L.*; *Azolla*, *Lam.*; *Salvinia*, *Mich.*; *Isoetes*, *L.*

ORDER CCLV.—LYCOPODIACEÆ—CLUB-MOSSES.

PLANTS with creeping or erect leafy stems, mostly branching. Leaves lanceolate, or awl-shaped, one-nerved. Spore-cases sessile in the axils of the leaves, sometimes all collected at the summit under leaves which are changed into bracts and crowded into a kind of catkin, one-celled or rarely two or three-celled, bursting, and containing either minute grains, appearing like fine powder, or a few rather large sporules; both kinds often found in the same plant (*A. Gray*).—EXAMPLES: *Lycopodium*, *L.*; *Selaginella*, *Spr.*

From the spore-cases of the *Lycopodiums* there is discharged a very fine light powder, which is employed as an absorbent in excoriations, and for rolling up pills. It is so inflammable as to be called *vegetable brimstone*, and burns with such rapidity that it does not set fire to bodies with which it is in contact. Great quantities of this powder are collected from *L. clavatum* and *L. selago*, in Switzerland and Germany.

ORDER CCLVI.—EQUISETACEÆ—HORSE-TAILS.

LEAFLESS plants with striated, jointed, simple, or branched stems (containing ducts and some spiral vessels) which are hollow and closed at the joints; each joint terminating in a toothed sheath, which surrounds the base of the one above it. Inflorescence consisting of peltate scales crowded in a terminal spike or kind of strotule (cone), each with several thecæ attached to its lower surface, bursting longitudinally. Spores numerous, with four elastic, club-shaped bodies (called elaters) wrapped round them (*A. Gray*).—EXAMPLE: *Equisetum*, *L.*

The Horse-tails grow in wet and marshy places. They have an astringent taste, and are considered stimulating; some have been recommended as powerful diuretics. They all contain a great quantity of silica in the cuticle of their stems, and therefore those of *Equisetum hyemale* are used in the arts for polishing marbles, cabinet-work, and ivory, under the name of *Dutch Rushes*.

ORDER CCLVII.—MUSCI—MOSSES.

THESE are small plants with very delicate, tufted roots, and a simple or branched stem. Leaves small, and of various forms, but commonly narrow and awl-shaped. Reproductive organs of two kinds:—1. The sterile flower, consisting of numerous minute, cylindrical sacs (*antheridia*), which discharge from their apex a mucous fluid filled with oval particles, and then perish. 2. The fertile flower, composed of numerous flask-like bodies (*pistillidia*), each having a membranous covering (*calyptra*) terminated by a long, cylindrical, funnel-mouthed tube (*style*). The ripened pistillidium becomes the capsule, which is rarely indehiscent, or splits by four longitudinal slits, but usually opens by a lid; beneath the lid, and arising from the mouth of the capsule, are commonly either one or two rows of rigid processes (*peristome*), which are always some multiple of four, those of the outer row are called *teeth*, of the inner *cilia*. An elastic ring of cells lies between the rim of the capsule and the lid. The powdery particles filling the capsule are spores.

TRIBE 1. *Andrææ*.—Spore-cases opening longitudinally into four equal valves, which are kept together at the summit by a persistent operculum.—**GENERA:** *Andræa*, *Ehrh.*; *Aeroschisma*, *Hook. f.*

TRIBE 2. *Bryæ*.—Spore-cases opening at the summit by a lid, and not by valves.—**EXAMPLES:** *Bryum*, *L.*; *Mnium*, *Dill.*; *Polytrichum*, *L.*; *Sphagnum*, *Dill.*

ORDER CCLVIII.—HEPATICEÆ—LIVERWORTS.

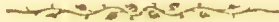
MOSS-LIKE plants of a loose, cellular texture, usually procumbent, and emitting rooflets from beneath. Stem and leaves confluent into an expanded, leaf-like mass; sometimes leafy, when the leaves are distinct from the stem, like the true mosses; entire or cleft, two-ranked, and often with an imperfect or rudimentary row (*amphigastria*) on the under-side of the stem. Reproductive organs of two kinds, viz. *antheridia* and *pistillidia*, as in mosses, variously situated. The matured pistillidium forms the spore-case, which is either sessile or borne on a long, cellular pedicel, and burst-

ing by irregular openings, by teeth at its apex, or lengthwise by two to four valves. A *columella* is rarely present. The *perianth* is a tubular organ enclosing the *calyptra*, which directly includes the pistillidium. Surrounding the perianth are involucred leaves of particular forms. The antheridia in the foliaceous species are situated in the axils of perigonal leaves.

SUB-ORDER I. JUNGERMANNIÆ.—Spore-cases opening by four valves, bursting irregularly; the spores mixed with elaters.—EXAMPLES: *Radula*, *Dumort*; *Jungermannia*, *Dill.*; *Anthoceros*, *Mich.*

SUB-ORDER II. MARCHANTIÆ.—Spore-cases not opening by valves, bursting irregularly; spores mixed with elaters.—EXAMPLES: *Marchantia*, *March.*; *Targonia*, *Mich.*

SUB-ORDER III. RICCIÆ.—Spore-cases not opening by valves, and having no elaters.—EXAMPLES: *Riccia*, *Mich.*; *Hemiscumata*, *Bisch.*



SUB-DIVISION V.—THALLOGENS.

THESE represent the lowest forms of vegetable life, and even in their highest development are simply an arrangement of congeries of cells forming an organised body, the root, stem, and leaves of which are undistinguishable from each other; sometimes they consist of a single cell or a repetition of the cell, each being in itself a perfect and independent organism. A great part of these plants exhibit no lengthened axis, but incline rather to spread centrifugally in all directions equally, or in one plane, so as to form a thallus, or bed, of vegetable matter. Their organs of reproduction are merely spores formed of single cells, imbedded in the tissue or budding forth from the surface or extremity of other cells. They embrace the following orders:—

Order 259. LICHENES.
260. FUNGI.

Order 261. CHARACEÆ.
262. ALGÆ.

ORDER CCLIX.—LICHENES—LICHENS.

CELLULAR plants, growing on the ground, on the bark of trees, old timber, and on the surface of stones and exposed rocks, to which they cling by their lower surface, often with great tenacity, while by the upper, they draw their nourishment directly from the air. Their fructification consists of spore-cases, called *thecæ* or *asci*, and, by their union, form circular, cup-shaped, or linear masses, called *cups* or *shields* (*apothecia*), resting on the surface of the thallus, or more or less immersed in its substance; or it is in powdery spots, scattered over the surface. Each spore-case contains four, eight, twelve, or sixteen spores, which divide into two, but generally remain coherent.—EXAMPLES: *Pulveraria*, *Ach.*; *Graphis*, *Fr.*; *Cetraria*, *Ach.*; *Roccella*, *DC.*

Some of the Lichens are used in the arts. *Lecanora tartarea* furnishes the dye-stuff known as *Cudbear*. The plant is macerated for ten or twelve days in urine, with water and chalk; the liquid acquires a red or deep purple colour, and the plant changes to a soft pulp. *Roccella tinctoria* supplies the colouring-matter called *Archil* or *Orchil*, which is obtained in the same way, by maceration in urine, or other ammoniacal mixture. *Iceland Moss*, so highly esteemed as a demulcent, and also as tonic and nutritious, is *Cetraria islandica*. It is well calculated for affections of the mucous membrane of the lungs and bowels, and is therefore useful in chronic catarrhs, and other pulmonary affections attended with copious expectoration; it is also of benefit in dyspepsia, chronic dysentery, and

diarrhœa. The plant is used as food in Iceland, either made into bread or boiled in water, the first water being rejected. *Reindeer Moss* is *Cladonia rangiferinus*, and supplies food to the reindeer. It is used by the Laplanders as food, made into jelly, being first washed in water, and then boiled in the milk of the reindeer.

ORDER CCLX.—FUNGI—MUSHROOMS.

PARASITICAL cellular plants, which have their origin in the production of copious, filamentous threads, called the *mycelium* or *spawn*. Rounded tubers appear on the mycelium; some of these rapidly enlarge, burst an outer covering (*volva*), which is left at the base, and protrude a thick stalk (*stipes*), bearing at its summit a rounded body, that soon expands into a *pileus* or cap. The gills (*lamellæ* or *hymenium*) that occupy its lower surface, consist of parallel plates, which bear naked sporules over their whole surface. A careful examination with the microscope shows that these sporules are grouped in fours. Certain of the cells (*basidia*) produce four small cells at their free summit, apparently by germination and constriction; these are the *sporules*. This is the development of the Agarics, but there are other modes of development. The lowest Fungi produce from their spawn only simple or branching series of cells; the mould itself either ramifies through decaying organic matter, as the the Moulds, or else like the Blight and Rust in grain, and the Muscardine, so destructive to silkworms; it attacks and spreads throughout living tissues, often producing great havoc before its fructification is revealed at the surface. Sometimes the last cells of the stalks swell into a vesicle, in which the minute sporules are formed; sometimes the branching stalks bear single sporules, like a bunch of grapes, or long series of cells, or sporules in rows, like the beads of a necklace, which, falling in pieces, are the rudiments of new plants (*A. Gray*).—EXAMPLES: *Agaricus*, *L.*; *Boletus*, *Dill.*; *Tremella*, *Dill.*; *Lycoperdon*, *T.*; *Pencillium*, *Link.*; *Uredo*, *Pers.*

The *Common Mushroom* found in our pastures is *Agaricus campestris*, and another edible British species is *A. Georgii*, but *A. prunulus* is said to be the most delicious mushroom. The *Morel* is *Morchella esculenta*, and *Tuber cibarium* is the *Common Truffle*. The *Vinegar Plant* is *Pencillium crustaceum*, and the *Common Mould* found on organic substances is *P. glaucum*. A long fungus, growing from the head of a caterpillar in New Zealand, and forming a horn as it were, is *Sphæria Robertsii*.

ORDER CCLXI.—CHARACEÆ—CHARAS.

Aquatic plants, which have all the simplicity of the lower Algæ in their cellular structure, being composed of simple, tubular cells, placed end to

end, and often with a set of smaller tubes applied to the surface of the main one. Their fructification consists of two kinds of bodies, of which the smaller is probably a mass of antheridia of curious structure, while the upper and larger is a sporocarp, formed of a budding cluster of leaves wrapped round a nucleus, which is a spore or sporangium (*A. Gray*).—**GENERA:** *Chara, L.*; *Nitella, Ag.*; *Charopsis, Kütz.*

They emit a fetid effluviu, which is said to cause the malaria of the Campagna of Rome, where these plants abound.

ORDER CCLXII.—ALGÆ.—SEAWEEDS.

CELLULAR plants, found in the sea, in rivers, lakes, marshes, and hot springs all over the world, consisting of a brown, red, or green thallus, sometimes stalked, which bears the organs of fructification. These organs consist of antheridian cells, containing *phytozoa*, and of others containing germinating spores of different kinds. They are often united in the same conceptacle; in other cases they are on different parts of the same plant, or even on different plants. The spores sometimes have moving cilia, and are called *zoospores*, at other times four are united, so as to constitute *tetraspores*. In some of the filamentous algæ there is a conjugation of two cells, so as to produce a spore, in others there is a fissiparous division of cells.

SUB-ORDER I. FUCACEÆ.—Brown or olive-coloured seaweeds, consisting of many-celled fronds, which assume a thalloid or a filamentous form. Fructification consisting of conceptacles containing archegonial and antheridian cells, the latter containing phytozoa, the former being developed as germinating spores.—**EXAMPLES:** *Fucus, L.*; *Laminaria, Lamæ.*; *Ectocarpus, Lynbg.*

SUB-ORDER II. CERAMIACEÆ.—Rose-red, purple, or red-brown-coloured, leafy, cylindrical, or filamentous marine plants. Fructification consisting of conceptacles containing spores, and clavate filaments considered as antheridia. The spores are often arranged in fours, and are called *tetraspores*.—**EXAMPLES:** *Ceramium, Adans.*; *Phyllophora, Grev.*; *Polysiphonia, Grev.*; *Rhodomenia, Grev.*; *Plocamium, Grev.*

SUB-ORDER III. CONFERVACEÆ.—Marine or fresh-water plants, of a green colour, one, or many-celled. The cells contain a green (rarely purple or red) endochrome. Reproduction effected by conjugation of cells; *zoospores* are often produced.—**EXAMPLES:** *Protoecoccus, Ag.*; *Palmella, Lynbg.*; *Nostoc, Vauch.*; *Rivularia, Roth.*; *Conferva, Fries.*; *Ulva, Ag.*

SUB-CLASS IV. DIATOMACEÆ—Brittleworts.—Plant consisting of a unilocular or a septate cell; cells composed of two symmetrical valves; gemmiparous increase by self-division; reproduction by conjugation and the formation of sporangia.—**EXAMPLES:** *Frustulia, Ag.*; *Diatoma, DC.*; *Desmidium, Ag.*

Many of the Algæ supply nutritious matter, and are used as food. Among them may be noticed species of *Rhodymenia* (*Dulse*), *Sphærococcus*, *Alaria*, *Iridæa*, *Laminaria*, *Porphyra*, *Ulva* (*Laver*), and *Gelidium*. The edible nest formed by swallows in China have been supposed to be made of portions of gelatinous sea-weeds. *Chondrus crispus* and *C. mamillosus* receive the name of *Carageen*, or *Irish Moss*. Their fronds consist in great part of a substance somewhat allied to starch, which is extracted by boiling in water. On cooling, it forms a jelly. Diatomaceæ occur in the form of extensive deposits in various parts of the world. It is said that the city of Richmond in Virginia is built on a stratum of Diatomaceous remains eighteen feet in thickness. Extensive tracts in arctic and antarctic regions are covered with similar relics of a former vegetation. *Laminaria saccharina* yields upwards of 12 per cent. of mannite. *Nostoc edule* is employed in China as an article of diet. *Sargassum bacciferum* constitutes the *Gulf-weed* which has been noticed by all who have crossed the Atlantic; it has never been found attached, but always floating (*Balfour*).

The following orders have been omitted in their proper places:—

ORDER XCVI*.—LORANTHACEÆ—LORANTHUS FAMILY.

SHRUBS either terrestrial or parasitical. *Leaves* opposite or alternate, entire, veinless, fleshy, without stipules. *Flowers* hermaphrodite, regular. *Calyx* tubular, adherent to the ovary, with a free, entire margin. *Petals* four to eight, often five or six, linear, frequently of great length and brilliant colours, quite free, sometimes slightly agglutinated at the base. *Stamens* equal in number and opposite to the petals, to which they are partially adnate at the base; *anthers* turned inwards, two-lobed, bursting by two longitudinal fissures. *Ovary* inferior, one-celled; *ovule* solitary, suspended from the summit of the cell; *style* filiform; *stigma* simple, sub-capitate. *Fruit* drupaceous, ovoid, fleshy or glutinous, crowned by a circular sear, or by the persistent rim of the calyx; one-celled and one-seeded. *Seed* with thin albumen; *embryo* filling the cell; *radicle* short, superior, next the hilum, with two to four large seed-lobes.

GENERA AND SYNONYMES.

Antidaphne, Pöpp.	„ Lonicera, Pl.	„ Seurrula, Don.	Baratranthus,
Ginalloa, Korth.	Helixanthera,	Notanthera, Don.	[Korth
Tupeia, Ch. & S.	[Lour.	Gaidendron, Don.	Nuytsia, R. Br.
Loranthus, L.			

GEOGRAPHICAL DISTRIBUTION.—Natives of the tropics, where the parasitical genera are found hanging in clusters from the trunks and branches of trees.

ORDER CCXVI*.—TILLANDSIACEÆ—TILLANDSIAS.

HERBACEOUS or shrubby plants, sometimes with a climbing, parasitical stem and a fibrous root. *Leaves* straight or sword-shaped, widened at the base, frequently forming a tuft at the base of the branches. *Flowers* in simple or compound bunches, very rarely solitary, always accompanied with bracts, which in a great measure cover them. *Perianth* of six divisions, either free or united by their base; three are altogether exterior, and three interior are longer. *Stamens* six, inserted quite at the base of the segments of the perianth, sometimes close together in the form of a tube. *Ovary* three-celled, many-ovuled; *style* simple, terminated by three stigmas. *Fruit* a membranous capsule with three many-seeded cells, opening loculicidally in three valves. *Seeds* compressed or linear, containing a small, erect embryo in the inferior part of mealy albumen.

GENERA AND SYNONYMS.

Tillandsia, <i>L.</i>	Guzmania, <i>R. & P.</i>	Cottendorfia, <i>Schlt. f.</i>	Renealmia, <i>Fcuill</i>
Renealmia, <i>Pl.</i>	Bonaparteia, <i>R. & P.</i>	Dyckia, <i>Schult. f.</i>	Achupalla, <i>Humb</i>
Amalia, <i>Hort. II.</i>	Acanthospora, <i>Sp</i>	Encholirium, <i>Mart.</i>	Hechtia, <i>Klotz.</i>
Strepsia, <i>Nutt.</i>	Misandra, <i>Dietr.</i>	Pouretia, <i>R. & P.</i>	Dasyllirion, <i>Zucc.</i>
Caraguata, <i>Pl.</i>	Navia, <i>Mart.</i>	Puya, <i>Molin.</i>	? Roulinia Brongn
Devillea, <i>Bert.</i>			

GEOGRAPHICAL DISTRIBUTION.—These are natives of the West Indies and South America between the tropics.

PROPERTIES AND USES.—*Tillandsia usneoides* is a parasitical plant, growing on the trunks of trees in the West Indies and the Southern States of America. Its stems are black or brown, with a whitish skin, as if covered with hoar-frost, slender and thread-like, sometimes three feet long, and hang down in tangled masses, whence the plant has been called *Old Man's Beard* in Jamaica. These shoots, which resemble horse-hair, are used for stuffing mattresses, pillows, sofas, saddles, and for packing. They are manufactured by tying the stalks in bunches and steeping them in water, or burying them underground in a moist place until the bark rots; they are then taken up, boiled in water, and washed until the fibres are quite clear of the pulp. When so prepared, they are not only used instead of horse-hair, but are so very like it that it cannot be distinguished from them without a strict examination, and that even with a glass, unless the branchings of it are observed. The Bovana bird's-nest is almost always made of it. In Peru, the plant, bruised and mixed with lard, is used against hemorrhoids. It has been erroneously stated to be bitter, tonic, and stomachic, purgative, and even diuretic. *T. utriculata* is a valuable plant in the woods of the West Indies, as containing a supply of water in dry seasons. The leaves are folded, or enclosed one within the other, each three feet and a half long, and three inches broad at the base, but ending in a point, and forming a basin, or cistern, containing about a quart of water, which in the rainy season falls on the upper parts of the spreading leaves, and being conveyed down them by channels, lodges in the bottom as in a bottle. The inspissated juice of *Bonaparteia juncea* is used in Peru as a vulnerary.

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TO

THE SPECIFIC, ENGLISH, AND ABORIGINAL NAMES AND THE VEGETABLE PRODUCTS.

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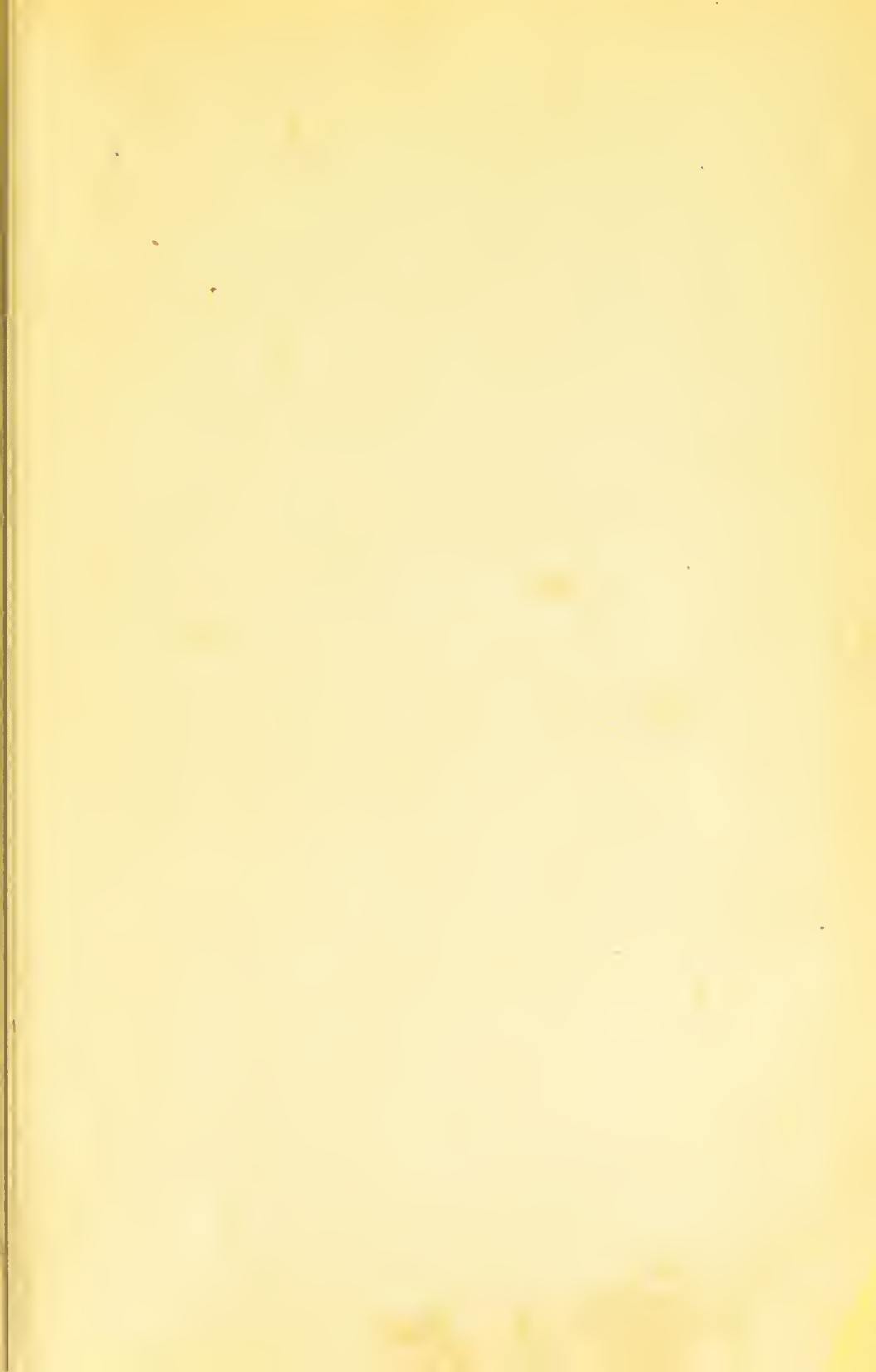
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